Anti-icing is a proactive approach to winter maintenance. This section will explain many of the basic anti-icing concepts.
Anti-icing is the application of a liquid de-icer prior to a storm or frost event. Reducing the bonding of the ice/snow with the pavement. Some organizations have tried anti-icing with granular or pre-wet salt and it works if it is applied immediately before the storm but the losses (salt leaving the road) are greater than applying a straight liquid.
Our goal is to get melting between ice and pavement. It is much faster and more efficient to do this by applying the deicer at this interface. Historically we have melted from the top down, is in much less efficient at getting the melting at the interface.

We do not intend to melt everything on the road, it isn’t necessary.
If it isn’t bonded, we can move it!

With a weak bond the snow and ice can be physically removed.
By adding grease to the pan before frying eggs we can prevent them from sticking to the pan. Thus easy removal.

By anti-icing the road before the storm we can prevent the snow from bonding to the pavement. Thus easy removal.
MnDOTs 2010 anti-icing guide:
“The rule-of-thumb is that removing ice or snowpack after it forms (de-icing) takes ten times more energy than preventing the formation (anti-icing)”

City of Mankato maintenance yard. Anti-icing applied hours before this photo was taken. Dry
Same LCS Treatment. Pavement temperature have risen to 15 degrees F. Light snow is falling
Expect the snow to cover the anti-icing

LCS Treatment at 15 degrees F pavement temps
Note the difference between the anti-icing photo and the typical city street photo. Same day, same storm, same time.
Streamer nozzles give us a wet/dry pattern. This is ideal for anti-icing. We do not want to get the entire road “wet”.

Check nozzles to make sure they are all working. If any are plugged we may be delivering more than the desired amount of liquid from other nozzles.
When applying liquids we apply to the drive lane. This is a different spread pattern than applying dry materials. Therefore the application charts are different. Point out the application rate charts for anti-icing are 1 lane width, 1 mile long.
30% more liquid on road by putting spray skirt 18 inches behind nozzles. Oregon state university study.
Oregon DOT says: “You can expect approx. 30% improved coverage using a spray skirt approx. 18" behind the spray bar. The skirt captures the vapor and allows it to drip down onto the ground VS mist off onto the shoulder/vehicles following etc. Several different types of nozzles were tested but the only AH HA moment was the improvement using the spray skirt.”

The top 2 photos are DOT trucks that apply liquids at higher speeds.

The bottom photo is an anti icing truck from a small MN city (City of Waconia). They have found that the anti-icing skirts improve the spread pattern even at slow speed applications.
Both public and private winter maintenance professionals agree that anti-icing is a proactive step in winter maintenance.
Don’t let a big start up cost keep you from experimenting with anti-icing. This small city used material from their shop plus a few extras to rig up their first anti-icing unit.

- Anti-icing setup:
  - 1 ton flatbed truck
  - 125 gal tank
  - ½ hp pump
  - 8’ spray bar

- Cost:
  - Tank ~$150.00
  - Pump ~$70.00
  - Plumbing > $100.00

- Total setup <$400.00
Don’t be stopped by the fact that you have to invest a lot of money to get started. You can start out small, home owners are also anti-icing.

Remember products are not labeled with the ingredients, you may have to look online or give them a call to find out what the ingredients are.
Page 11 of the manual has the anti-icing application rate chart.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Gallons per lane mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>CaCl₂ or MgCl₂</td>
<td>15-25</td>
</tr>
<tr>
<td>Regularly scheduled application</td>
<td>15-25</td>
</tr>
<tr>
<td>Prior to frost or black ice</td>
<td>15-25</td>
</tr>
<tr>
<td>Prior to light or moderate snow</td>
<td>15-25</td>
</tr>
</tbody>
</table>
Page 11 of the manual has the anti-icing application rate chart

Try an example with the class so they are used to looking at the chart and they know how to use it.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Gallons per lane mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>CaCl₂ or MgCl₂</td>
<td>Brine</td>
</tr>
<tr>
<td>Regularly scheduled application</td>
<td>15-25</td>
</tr>
<tr>
<td>Prior to frost or black ice</td>
<td>15-25</td>
</tr>
<tr>
<td>Prior to light or moderate snow</td>
<td>15-25</td>
</tr>
</tbody>
</table>
Point out once again that the application rates are based on a single lane mile not a double lane mile. This causes some confusion because the de-icing chart is for a 2 lane mile.

<table>
<thead>
<tr>
<th>Condition</th>
<th>CaCl$_2$ or MgCl$_2$</th>
<th>Brine</th>
<th>Brine Blends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regularly scheduled application</td>
<td>15-25</td>
<td>20-40</td>
<td>Ask manufacturer</td>
</tr>
<tr>
<td>Prior to frost or black ice</td>
<td>15-25</td>
<td>20-40</td>
<td>Ask manufacturer</td>
</tr>
<tr>
<td>Prior to light or moderate snow</td>
<td>15-25</td>
<td>20-50</td>
<td>Ask manufacturer</td>
</tr>
</tbody>
</table>
Routine anti-icing is not the most efficient way to anti-ice. It is better to monitor the weather and anti-ice when winter weather or frost is predicted.

If you are determined to anti-ice on a regular schedule, monitor pavements and do not re-apply if prior treatment is still in place.
Anti-icing isn't for every situation. Here are a few things to consider. There are many other considerations that may be unique to your operations. The anti-icing flow chart in the appendix of the manual is one organization's way of making smart choices. You can also set up a flow chart for your organization that helps you make good anti-icing decisions.

- Don’t want to make dry road slippery
- Leave dry stripes as a safety net
- Hygroscopic products use lower rates than brine
- Don’t use hygroscopic liquids on warm or humid days. Can get greasy
- Don’t apply salt brine on super cold days. May ice on road.
Page 34 of the manual, has a form you can use to record your anti-icing efforts. This is in appendix B.
If we use liquids we can reduce the amount of granular salt needed. Liquids have less environmental impact than granular products. However remember this, if you add liquids and don’t turn down the granular amount, you have increased your environmental harm.
Example of a poor choice. Dry salt being applied to a microscopic layer of ice on the road. Anti-icing would have prevented this road from icing up. Much better public safety. Much cheaper maintenance. Much less environmental harm.
If you want to be on the “varsity” team for winter maintenance, anti-icing should be part of your operations.