

# Science on the Slopes

Environmental Education & Wellness Program



Physical Science

## Human Snowmaking

### How Do You Think We Make Snow on the Mountain?

**Snowmaking and the Water Cycle.** Snowmaking is a very simple process that calls for the same basic ingredients as natural snow – water, air and cold temperatures.



#### Where Does the Water Come From?

Open this [graphic organizer](#) to help visualize the path.

To begin to follow this process at Wachusett Mountain Ski Area we must start at the snowmaking pond (water source) located at the base lodge. The pond was created to intercept the runoff of snow as it melts and flows down the mountain and was also designed to draw water when needed from nearby Wachusett Lake. Over time, water is sent back to the lake to complete Wachusett Mountain Ski Area's self contained, miniature water cycle.

#### How does the water get up to the top of the mountain?

When it is time for making snow, water from the snowmaking pond is drawn through underground pipes and sent to the pump houses. The two pump houses at the base of the ski mountain work together to move the water into the compressor building. Once the water reaches the compressor building it meets up with a system of pipes carrying highly pressurized air. Next, the pressurized air and water exit the building still contained in their own pipes and travel alongside each other to join a system of hydrants positioned at the base of the ski trails. From the hydrants the compressed air and water are fed through hoses to connect to the snow guns strategically located along each trail. Wachusett Mountain Ski Area uses primarily HKD tower snow guns. These tall, thin silver guns mounted on towers along the ski trails are engineered to produce the best artificial snow possible. To learn more about **snow gun designs** go to [Basics of Snow Gun Design](#) or return to the Engineering and Technology home page.

#### What are two ways the compressed air helps turn the water into snow?

Even though snow gun designs vary, their goal is to release the water and compressed air at the same time high above the slope. The hoses carrying the highly pressurized air and water enter the snow gun separately but when they meet up, the **compressed air pushes out the water into tiny streams** or mist. As the pressurized air shoots out of the snow

gun it immediately **loses its energy, slows down and cools off creating a drop in the overall temperature** directly where the water is jetting out. When the water droplets come into contact with this colder air they give up their energy to the air particles, slow down and freeze into tiny ice crystals. This **physical change** of water to tiny ice crystals occurs instantly and they start to fall to the ground. The height of the snow guns is designed to allow the falling ice crystals to hang in the air and clump into slightly larger ice balls or clumps of artificial snow. More “hang time” increases the chances of the tiny falling ice crystals to form larger clumps and makes a better quality snow. The whole process is guided by computer software, which monitors the air/water ratio, as well as the temperature and relative humidity on the mountain. If you are interested in learning more, go to the [best conditions for snowmaking](#).

Nature’s snow consists of about 10% ice and 90% air, while human-made snow is almost 30% ice and 70% air. While it may feel a little different from natural snow, the artificial snow can be more durable for creating a base for the season or for shaping into jumps, pipes and terrain parks.

<https://www.summitdaily.com/news/just-the-facts-whether-fresh-or-stale-artificial-snow-behaves-quite-differently-than-natures-own>