Measuring snow with a bucket, a windmill, and the sun?

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In Maine, government scientists have figured out how to measure snowfall in remote areas with a bucket, a small windmill, and the sun - all the while saving money, energy, and, ultimately helping to save lives.

What led to this energy-efficient ingenuity was the need to help the National Weather Service forecast and predict the risk of floods from spring snowmelt.

The problem was this: While the USGS has about 15 snowmelt measurement sites in Maine, they also needed a way to measure snowfall in remote areas where power grids are scarce. Emergency managers need accurate information to prepare for forthcoming hazards and energy companies need to plan ahead for how much water to expect in reservoirs.

"We needed to find an alternative power source," said Bob Lent, chief of the USGS Maine Water Science Center in Augusta. "So we cobbled together a small-scale commercial windmill to replace commercial AC power, and supplemented the windmill with solar panels. What we ended up with is a windmill that powers our measurements on windy and cloudy days, and solar panels that power them on calm, sunny days," said Lent. "And," he added, "not only will we get more accurate information, but the systems will pay for themselves in about 3 to 4 years since using the electricity-dependent devices cost between $200 and $400 a year."

A prototype system has been housed in use at the USGS office in

Augusta for the past winter. It has proved so accurate, said Lent, that the USGS plans to install four snowfall sites around the state this summer using the same system.

Basically, the system looks like this: a gage is attached to a 5-gallon bucket that sits atop a simple wooden platform on a metal pole. The gage has a heating element to melt the snow as it collects in the cone of the bucket. The gage only turns on when snow is detected. Nearby is a data-collection box that is linked to the windmill and solar panels. When the bucket fills up with melted snow it tips over and empties. Each tip of the bucket measures 0.01 inches of precipitation and is recorded to the data recorder, which transmits the data and is updated on the web every hour.

"We are very optimistic about the utility of this system in other remote areas in the country and not just for snowfall measurements. It would be good for any remote site that needs more power than solar alone can deliver. For example, this could be used to measure water quality in the swamps of Florida as well as snowfall in Maine," Lent noted.

"It's a very small step in a very long journey of helping this country become greener, but this embodies what we need to be doing and the direction in which we need to be going," said Lent.

Source: United States Geological Survey (news : web)