Quest News

Bees and ESPs show the power of electricity

By Sheila Nero

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A bumblebee brings its positive electric charge to a New England aster, picking up pollen grains that carry a negative charge. Photo provided by John Leon.

Talk about the power of positive energy. It turns out flowers have a negative charge relative to the air around them. And bumblebees winging toward those flowers have a positive charge. What does this have to do with DTE Energy's electrostatic precipitators, which collect fly ash?

Bert Urbani, environmental planner, Environmental Initiatives, says, "I heard an NPR interview about bees and flowers and electrical fields, and it struck me that this is similar to the way ESPs operate at our power plants. It has been my passion for 30-plus years at DTE to connect employees and company operations with the natural world, and this is such a cool connection."

Urbani explains how the flight of the bumblebee and the process of ESPs intersect: When bees fly through the air, the friction of the air and the friction of its body parts with one another causes a bee to be positively charged. It's like shuffling across a carpet in wool socks.

When a positively charged bee lands on a flower, the negatively charged pollen grains naturally stick to her. So, in the seconds just before the bee lands, there is electrical activity in the plant. The plant's electric field is changed by the proximity of that positively charged bee. And once the bee leaves, the field stays changed for 100 seconds or so. This probably helps the next bee that buzzes by. She won't stop to investigate a flower that's already been visited.

The description from nature resembles what happens in the electrostatic precipitators (ESPs) our company uses at our power plants -- fly ash particles have a negative charge and the ESP plates have a positive charge. The particles are attracted to the plates and stick to them,

instead of flowing out of the plant stacks, thereby reducing emissions. When the plates are coated with fly ash, they are shaken (or rapped), and the particles fall off. The particles are then collected for recycling or disposal.

David Nordstand, specialist-technological, Engineering Support Organization, Draft and Combustion, Fossil Generation, considered the parallel between bees and ESPs. He says, "My first thought is that I wish we could be selective as to where or what we need to collect, like the bees. The bees have a sweet deal going on. A poorly functioning flower – no nectar – can be avoided, providing high efficiency on product delivery back at the hive.

This St. Clair Power Plant photo shows the south side of the ESP on Unit 6. Photo supplied by David Nordstrand.

"For our electrostatic precipitators, we are measured on the amount of ash available for collection. Some particles just don't have the chemistry required to develop an electric charge that supports collection, so we can't catch everything.

"My second thought is that all flowers should have Continuous Emission Monitors (CEMs). As the bee launches off the flower, pollen is left in the air around the flower. Loose pollen does cause issues for people with allergies. A CEM would make it easy to identify the worst polluting flowers and regulate their emissions."

The bees, of course, aren't thinking about DTE and ESPs while they buzz around Michigan. They're just winging it.

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