

NYSP21 Performs Assessment of Dandelion Energy's Geothermal Vertical Ground Loop Installation

Located in Brooklyn, New York, Dandelion Energy, Inc. (Dandelion) offers affordable geothermal heating and cooling systems to homeowners in New York State. Dandelion utilizes a new proprietary drilling technology for geothermal system installations, enabling access and minimal disruption to the installation sites.



Dandelion's Terrasonic Drill Rig and Pipe Rig

CHALLENGE

Dandelion commenced their first geothermal installations in the fall of 2017, in New York State. With the challenges of installation logistics, Dandelion requested assistance from the New York State Pollution Prevention Institute (NYSP21) to perform on-site assessments of Dandelion's proprietary drilling technology and the conventional drilling technology to identify opportunities to optimize Dandelion's installation process.

SOLUTION

NYSP21 performed two on-site assessments at separate locations, one for Dandelion's new process and the second for a conventional geothermal installation. Leveraging Lean Six-Sigma principles, detailed process steps and resources were recorded to identify potential opportunities to improve installation efficiency. Each step of the installation process was documented by NYSP21, including duration, equipment, personnel, fuel, and water consumption. Additionally, a detailed analysis was performed based on observed data to identify value-add and non-value add operations as well as fuel consumption, CO₂e emissions, and drill rate throughout the installations.

RESULTS

Through observations, process mapping, and calculations, NYSP21 identified

CHALLENGE

- Dandelion wanted to better understand their geothermal installation logistics

SOLUTION

- NYSP21 performed on-site assessments of Dandelion's proprietary drilling technology and the conventional drilling technology

RESULTS

- Through observations, process mapping, and calculations, NYSP21 identified several advantages of the Dandelion installation process
- Enhancements to Dandelion's geothermal installation time will reduce the greenhouse gas emissions break-even to install the ground source heat pump from the current level of 3.4 months
- Dandelion anticipates the success of their geothermal installation process will create 150 New York State jobs over the next 3 years



several advantages of the Dandelion installation process including:

- Dandelion's smaller and lighter equipment has the ability to work in confined areas, enabling access to more geothermal installation sites
- By using a smaller diameter bore hole, significantly less grout (66%) was required for the Dandelion installation process
- Dandelion's drill pipe connect / disconnect process was efficient and faster than the observed conventional well drilling process
- Dandelion's equipment enabled removal all steel casing from the ground, while conventional drilling left the casing in the ground

Improvement opportunities were identified by NYSP2I for Dandelion's installation process, which included the following:

- Multiple opportunities to reduce non-value-add time during installation through process controls and technology maturity
- Further reduction of installation time with tooling adjustments, enabling faster drill rates
- Reduced fuel consumption, realized by incorporating more fuel efficient auxiliary equipment, (e.g. air compressor)

Enhancements to Dandelion's geothermal installation time will reduce the greenhouse gas emissions break-even to install the ground source heat pump from the current level of 3.4 months³. Dandelion anticipates the success of their geothermal installation process will create 150 New York State jobs over the next 3 years.

³Installation emissions of 2MT CO₂e only considers emissions to drill a 400 ft. borehole, not delivery of equipment, materials, or trenching to the building. Emissions savings assumes 2400 sq. ft. house with ground source heat pump, reducing heating and cooling emissions by approximately 7 MT CO₂e per year.

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