



Via Electronic Mail
September 10, 2021

Mark Stewart, Program Manager
Climate Change Program
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230

RE: Comments from Dandelion Energy on the Building Energy Transition Plan -
Discussion Draft (dated September 3, 2021)

Dear Mr Stewart,

Thank you for the opportunity to comment on the Building Energy Transition Plan - Discussion Draft and share more information about how geothermal energy can contribute to Maryland's 2030 Greenhouse Gas Reduction Act Plan goals.

Dandelion applauds Maryland in articulating ambitious goals to reduce emissions by 40% by 2030, and 80-95% of gross emissions by 2050, and in creating the Building Energy Transition Plan (Plan) as part of its plans to meet these goals.

We also applaud Maryland's legislature and Governor for passing and signing the Renewable Energy Portfolio Standard and Geothermal Heating and Cooling Systems Act (HB1007) earlier this year, which will support the future growth of the ground source heat pump (GSHP) industry in Maryland when it goes into effect in 2023.

Dandelion is one of the leading residential geothermal companies in the United States. We provide high-efficiency, ground source heat pumps (GSHPs) and are on a mission to democratize the geothermal market and enable any homeowner to afford and install a geothermal system and see instant energy bill savings. Harnessing the thermal energy in the ground beneath our feet, geothermal systems are the most efficient, reliable, and lowest carbon approach to electrifying home heating and cooling. (See Appendix A for Background on Geothermal and Dandelion).

The geothermal industry is where solar and wind were 15 years ago. Customer adoption is just beginning to accelerate. Despite the high efficiency and tremendous potential of GSHPs, they currently account for a small fraction of the heating and cooling market. Historically, this is due to higher up-front costs, limited consumer awareness, and low state incentives. Dandelion, through a combination of rapid technological innovation and economies of scale, is working to overcome the awareness and cost barriers. In the past year, Dandelion has expanded from its headquarters in New York into Connecticut, Massachusetts, and Vermont as a direct result of increased state incentives for GSHPs in those states (See Appendix A).

Ground Source Heat Pumps' role in Building Energy Transformation in Maryland

We see an untapped opportunity for GSHPs to play a larger role in electrifying heating and increasing the efficiency of cooling in Maryland and would recommend the Building Energy Transition Plan consider the characteristics of GSHP that are particularly advantageous for achieving Maryland's emissions reduction goals at low costs:

- 1) GSHPs provide a whole system heating and cooling solution without back-up fuels and costly building envelope upgrades.

GSHPs typically serve as whole system replacements, entirely eliminating the need for delivered fuels such as fuel oil or propane in a home without the need for costly building envelope improvements envisioned in the High Electrification scenario. The E3 study assumed the need for these costly improvements within the High Electrification scenario. With GSHP providing whole home heating and cooling even in cold climates, these costs can be avoided, bringing down the overall cost of High Electrification scenarios.

- 2) GSHPs provide low costs for consumers.

GSHPs offer Maryland homeowners the opportunity to meet both their heating and cooling needs with the most efficient, clean electric technology. GSHPs are recognized by the U.S. Environmental Protection Agency as one of the most efficient and comfortable heating and cooling technologies currently available.¹ GSHP and other all-electric technologies also allow consumers to pay the lowest annual bills in the long-term, for either retrofits or new construction, as shown in Figure 14 of the Plan Discussion Draft.

- 3) GSHPs provide grid benefits relative to other electrification technologies.

¹ US EPA, ENERGY STAR: [Geothermal Heat Pump Website](#)

Both ASHPs and GSHPs will be necessary technologies for electrifying and decarbonizing heating in Maryland’s buildings. However, they have different attributes that should be taken into consideration by policy-makers. Accelerating the adoption of GSHPs will provide significant grid benefits, which will be particularly important in minimizing increases in winter system load for Maryland.² The Brattle Group estimated the impacts of GSHP on summer load and found:

- “Significant deployment of ground source heat pumps would meaningfully reduce summer peak electricity demand in Maryland, due to their greater efficiency relative to conventional air conditioning systems.
- “For a representative Maryland house, a ground source heat pump would reduce peak consumption by about 1.5 kW. This would save about \$179 per year in overall peak-related system costs associated with generation, transmission and distribution.”

Another study by the Brattle Group found that fully electrifying New England’s heating sector using GSHPs would only minimally impact peak demand and leave energy prices unchanged, whereas switching to ASHPs would nearly double the peak and increase electricity prices by up to 20%.³

In New York, NYSERDA has found three significant areas of benefit beyond energy savings:⁴

- The value to ratepayers of reducing systemwide peak electric load.
- The so-called “inverse cost shift” effect, which can result in heat pump customers paying for more than their fair share of fixed electric grid costs, reducing burdens on other ratepayers.
- The societal value of reducing greenhouse gas emissions (“carbon value”)

Key Recommendations

Dandelion applauds the Building Sub-group for recognizing the importance of converting fossil fuel heating systems to efficient electric heat pumps in the Building Energy Transition Plan - Discussion Draft. We also strongly support the Plan’s overall approach of outlining Core Recommendations that align with potential futures in which either the “High Electrification” or the “Electrification with Fuel Back-up” scenarios turn out to be the most cost-efficient.

² Brattle Group, [Ground Source Heat Pumps: Peak Impacts in Maryland](#), p. 1.

³ The Brattle Group, [Heating Sector Transformation in Rhode Island: Pathways to Decarbonization by 2050](#), Pages 30-31

⁴ NYSERDA, [New Efficiency: New York - Analysis of Residential Heat Pump Potential and Economics](#), Page 58,

In particular, Dandelion strongly supports the E3 Study’s Key Conclusions⁵ that:

1. “New residential buildings should be all-electric”.
2. “Achieving greater electrification of heating loads (when winter peak electricity demand would exceed current electricity system capacity) could become the lowest-cost pathway if federal funding for electricity system improvements becomes available, building shell improvement costs are reduced, utility demand management is enhanced, and/or low-carbon fuel costs come in on the high end of the price range.”
3. “A well-coordinated utility transition plan is critical to protect ratepayers.”

We also support, in part, the Key Conclusion that:

- “Space and water heating loads should be met with efficient electric heat pumps, at least to the point when winter and summer peak electricity demand are roughly equal.”

However, given (1) the potential high future costs of low-carbon fuels, (2) the high likelihood of significant federal investment in grid infrastructure upgrades, we would recommend the Plan leave open the possibility that electrification should proceed beyond a point when winter and summer peak electricity demands are equal.

The Core Recommendations articulated in the Plan address high priority issues and are appropriately aligned with the Key Conclusions. In particular, Dandelion strongly supports:

- The adoption of an All Electric Construction Code, and
- The development of a Clean Heat Program, including Fuel Switching and Beneficial Electrification through EmPOWER post-2024.

We also respectfully recommend that the Building Energy Transition Plan:

1. Strongly emphasize the need to transition in EmPOWER’s goals from a sole focus on electricity reduction “to a portfolio of mutually reinforcing goals, including GHG emissions reduction, energy savings, net customer benefits, and reaching underserved customers” (pg. 12). This transition, as articulated in the Discussion Draft, is particularly important to support Building Energy Transition for Maryland, and warrants additional emphasis.
2. With respect to the Clean Heat Program, adopt language that clarifies that Fuel Switching and Beneficial Electrification through EmPOWER will be ‘Encouraged’, rather than ‘Allowed’ post-2024.

⁵ Key Conclusions listed on pg. 9 of the Building Energy Transition Plan - Discussion Draft

3. Incorporate a specific suggestion that the 2024-2026 EmPOWER MD provide a per-ton funding model for GSHPs incentives for New Homes and Existing Homes, at a level that is complementary to the geothermal carveout that HB1007 created in the state's Renewable Portfolio Standard.

Conclusion: Scaling GSHPs in Maryland

Dandelion thanks the Building Sub-group for allowing us to provide comments on the development of the Building Energy Transition Plan - Discussion Draft.

As highlighted in these comments, GSHPs offer significant grid benefits and reduce system peaks while giving Maryland homeowners the opportunity to replace their existing heating systems with the most efficient, clean electric technology that will have the greatest reduction on their annual bills in the long-term.

Sincerely,

A handwritten signature in black ink, appearing to read 'MS', with a horizontal line extending to the right.

Michael Sachse

CEO, Dandelion

Appendix A - BACKGROUND ON DANDELION AND GEOTHERMAL

1. How Ground Source Heat Pumps Work:

GSHPs work by collecting heat from the ground, where it remains a constant 55 degrees Fahrenheit year round, and transferring it to heat your home. In the summer, the system works in reverse, collecting heat from the home and transferring it to the ground. The GSHP systems installed by Dandelion serve as complete replacements for heating and cooling systems in the house, allowing homeowners to remove existing boilers and furnaces.

Dandelion installs residential geothermal in two steps. First, we drill vertical holes underground and insert buried pipes filled with fluid (called ground loops) that are used to transfer heat between the home and the ground. We then connect these loops to the interior of the home. Second, we install a heat pump inside the home that exchanges and concentrates heating energy between the home and the loops (for a deeper explanation, please visit: dandelionenergy.com). The system life is estimated at up to 25 years for the heat pump and 50+ years for the ground loop.⁶

Figure 1: How Geothermal Works



2. Dandelion's History, Target Customer, and Job Creation Potential:

⁶ DOE, [Geothermal Heat Pumps](http://www.energy.gov/geothermal-heat-pumps)

Dandelion's goal is to drive down system costs and bring geothermal to the mass market. Dandelion's software-guided system design and smaller drilling rigs allow us to right-size systems for middle class homeowners on smaller lots than otherwise possible. Dandelion offers a financing option for customers, which approximately half of our customers select. While we install geothermal systems in homes of all sizes, our ideal customer has a 1500-3000 SQFT home currently heated by fuel oil or propane, which we can cost-effectively convert to a single 4 or 5 ton geothermal heat pump system.

Dandelion is headquartered in New York State. Since launching in 2017, we've created over 135 jobs, 75% of which are either drilling or HVAC installation jobs. To service new markets, we typically open new warehouses and train new drilling crews and installers, resulting in an average of 50 jobs per warehouse and multiple warehouses per state. Just as the solar industry retrained local contractors, the geothermal industry does the same for the HVAC contractors and for oil, gas, and water well drillers. This extends to our leadership team. Dandelion's VP of Drilling, Jason Smith, transitioned to geothermal after 18 years in the oil and gas industry due to tremendous growth potential in the geothermal industry.⁷

Meaningful per-ton incentives for GSHPs have been present in the New York market since Dandelion's inception and are one of the main reasons Dandelion decided to establish its headquarters there. The presence of stable, per-ton incentives and a focus from NYSEDA and the utilities on increasing awareness among consumers for GSHPs have allowed Dandelion to continue to drive down costs resulting in lower prices for customers. In 2017, Dandelion was paying nearly twice as much on average per heat pump. With increased demand in New York, Dandelion obtained access to scaled pricing and direct-sourced contract manufacturing. As scale continues to increase, heat pump prices should become even more competitive than they are today, driving costs for homeowners down further.

In late 2020, Dandelion entered Connecticut following an increase in state incentives for geothermal and has expanded its footprint there in 2021. Early in 2021, Dandelion started serving Vermont following the introduction of per-ton incentives by Green Mountain Power⁸ and has recently entered Massachusetts following the introduction of per-ton incentives to Mass Save.⁹ Dandelion is now actively considering which markets to enter next, including Maryland. The policy environment will be a major driver of our decision.

⁷ Eletrek, [This Fossil-Fuel Exec Jumped to Geothermal. He Tells us Why](#)

⁸ GMP, [News Release](#), 5/19/21

⁹ Mass Save, [Electric Heating and Cooling Equipment](#)