TENs vs. Individual Building Conversions

Moderator: Ryan Carda / *Midwest Geothermal*

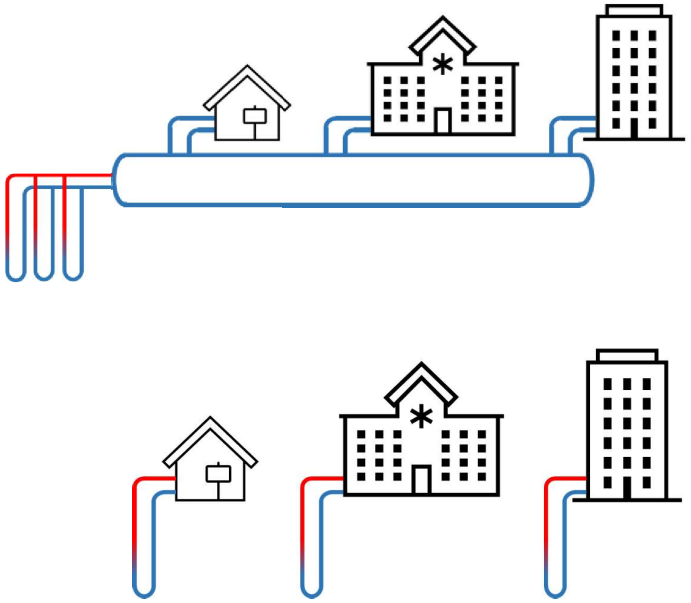
Panel: Sue Dougherty / *NYSERDA*

Brian Urlaub / *Salas O'Brien*

Morgan Hood / *VGS*

Wyatt Roberts / *Dandelion Energy*

Thermal Energy Networks vs. Individual Building Conversions



Sue Dougherty, Program Manager, New Construction and TENs

NY-GEO 2026 Conference

March 24, 2026

NEW YORK STATE | NYSERDA
New York State Energy Research and Development Authority

WHEN TO CONSIDER A THERMAL ENERGY NETWORK?

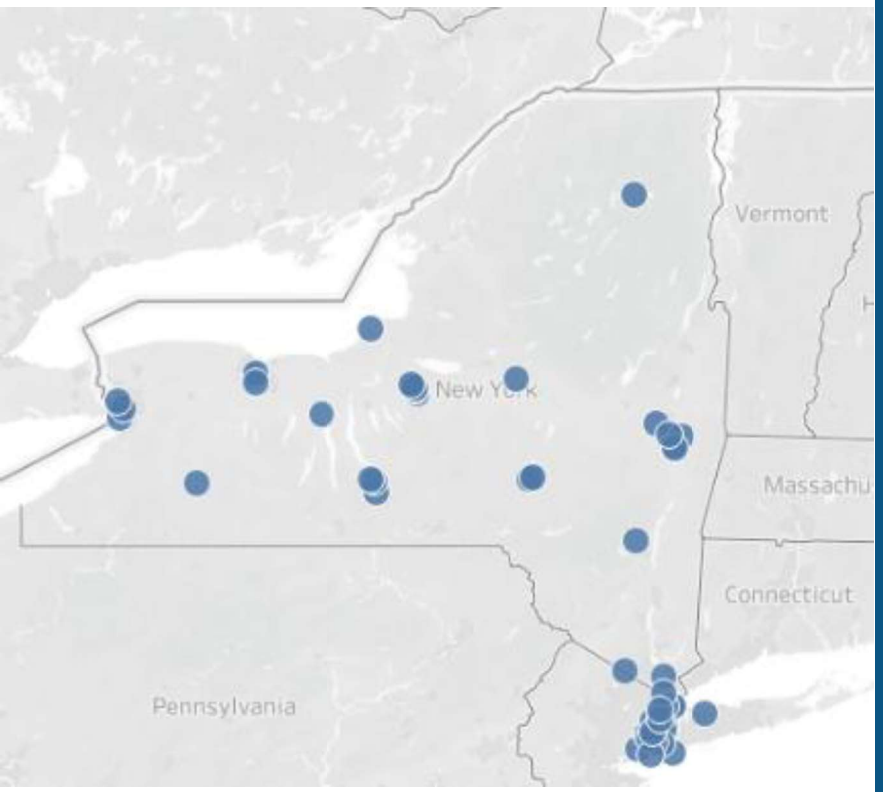
Opportunity indicators

- New construction or preparing for future expansion
- Close building proximity and high heat density
- Presence of thermal load diversity
- Availability of thermal resources (geothermal, wastewater, waste heat)
- Existing district system at end of useful life
- Integration with other large public infrastructure projects (highway, municipal water/wastewater)

Target outcomes

- Reduce peak electric demand and avoid electric infrastructure upgrades
- Reduce energy use
- Reduce lifecycle costs
- Improve access of low carbon thermal resources (geothermal, waste heat wastewater)
- Reduce thermal resource infrastructure

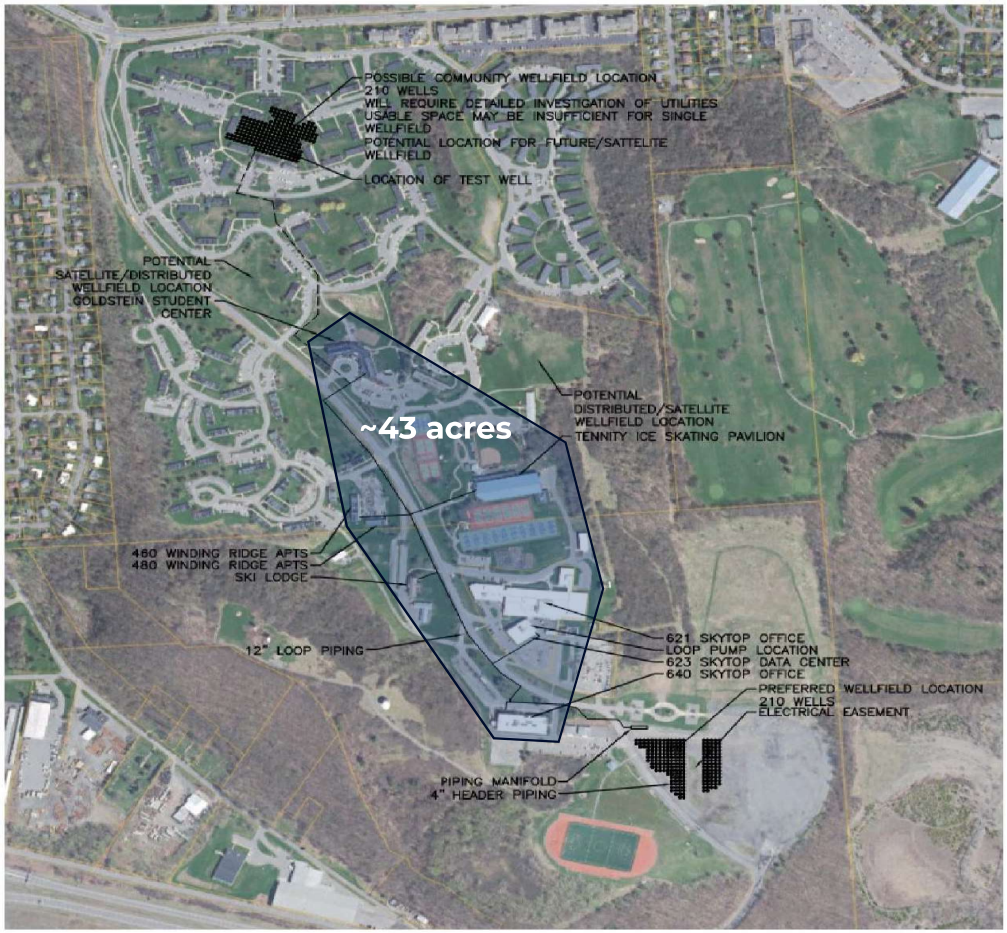
SITE-SPECIFIC FEASIBILITY STUDIES



- NYSERDA pilot program (2021-2023) to evaluate TENs opportunities in NYS
- Funded ~50 site-specific feasibility studies
- Each study evaluated both standalone heat pump and TENs approaches to determine optimal technical and economic solution
- 20 published feasibility studies (and more arriving soon)

SYRACUSE UNIVERSITY

Building	Annual Energy (MMBtu/yr)
623 Skytop Data Center	11,169
621 Skytop Office Building	15,520
Tennity Ice Skating Pavilion	8,815
Goldstein Student Center	9,943
Skytop Office Building	2,352
Ski Lodge	1,216
480 Winding Ridge Apartments	311
460 Winding Ridge Apartments	466
Total	**49,792**



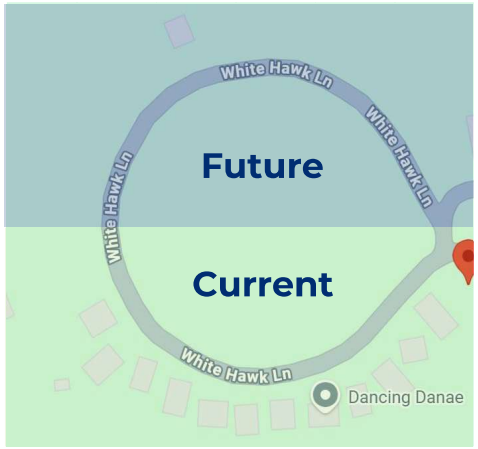
Network Approach *More* Favorable

- High area heat density (~1,100 MMBtu/acre/yr)
- High heating and cooling demands
- High load diversity
- Lower upfront and lifecycle costs for a network
- Space for geothermal borefields

https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/About/Publications/Research-and-Technical-Reports/Clean-Heating-and-Cooling-Reports/Large-Scale-Thermal/PON-4614/22-36-Syracuse-University-Community-Heat-Pump-Study-acc.pdf

WHITE HAWK ECOVILLAGE

5.7 acres



500 FT

500 FT

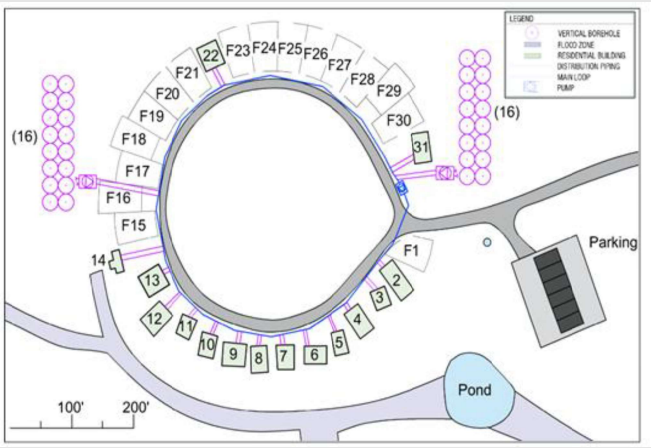
	Current	Future
No. of Houses	**15**	**31**
Thermal Energy (MMBtu/yr)	**850**	**1,756**
Area Heat Density (MMBtu/acre/yr)	**150**	**308**

Network Approach *Less* Favorable

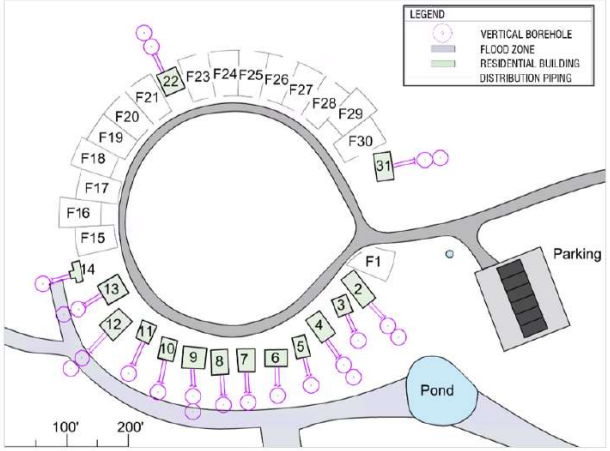
- Low area heat density
- Low heating and cooling demands
- Low load diversity
- Higher upfront and lifecycle costs for a network
- Space for standalone systems (distributed boreholes)

https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/About/Publications/Research-and-Technical-Reports/Clean-Heating-and-Cooling-Reports/Large-Scale-Thermal/PON-4614/24-19-White-Hawk-Ecovillage-Feasibility-Study.pdf

Network

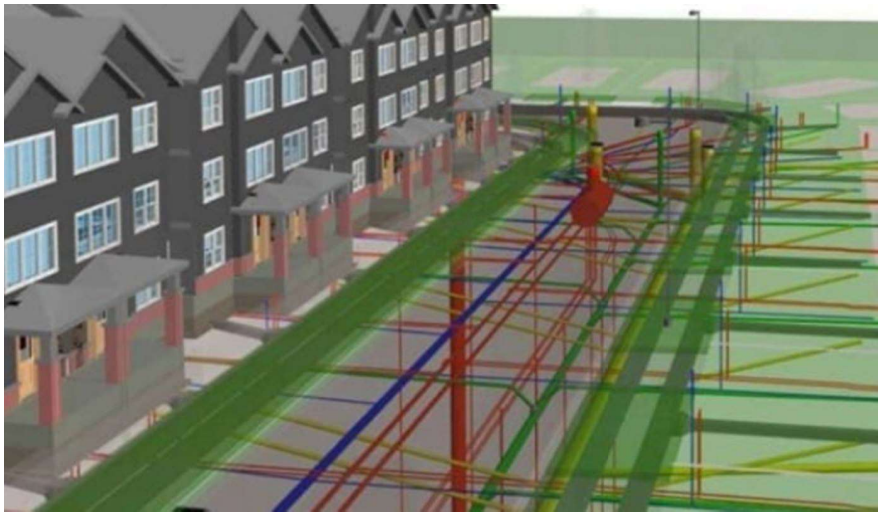


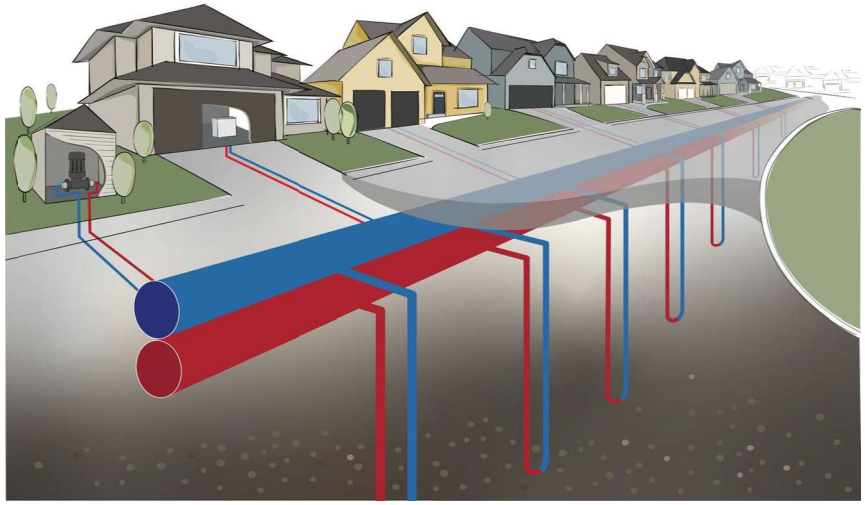
Standalone



FEASIBILITY STUDY FUNDING

- Cost-share funding to perform energy studies and planning
- Includes *geothermal* and *thermal energy network* feasibility studies
- Open enrollment, apply anytime
- Learn more by visiting the FlexTech website





Thermal Energy Networks – When and Why

PRESENTED BY
Brian Urlaub
Director of Geothermal Operations
Brian.Urlaub@salasobrien.com

Salas O'Brien

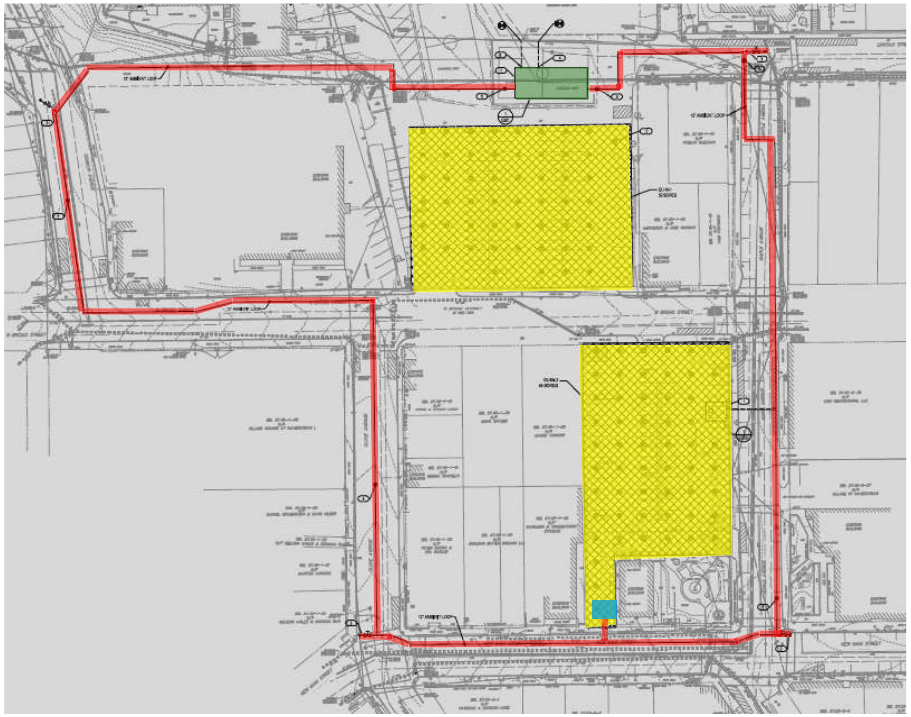
Advantages & Realities of a TEN

- **When it makes sense:**
  - Load sharing and diversity – Large diversity loads can greatly offset the need for expensive thermal resources.
  - Use of multi-source energy options, i.e., waste heat, surface water, etc.
  - If the buildings don't have any options to do stand alone geothermal.
  - 3rd party ownership/Utility ownership with amortized cost models and benefits of scale for costing.

- **Realities:**
  - Cost: interconnecting pipes and infrastructure adds cost
  - Parasitic pump energy reduces overall efficiency
  - Space for infrastructure could be an issue
  - Logistics of operation and maintenance, right of way access, easements, ownership, etc.

Salas O'Brien

GLHX & WWHX Together

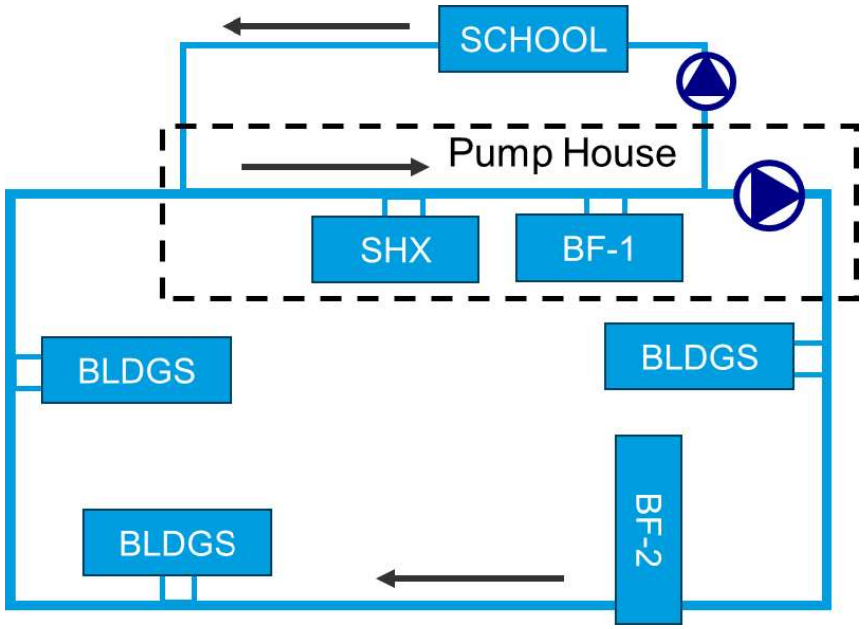


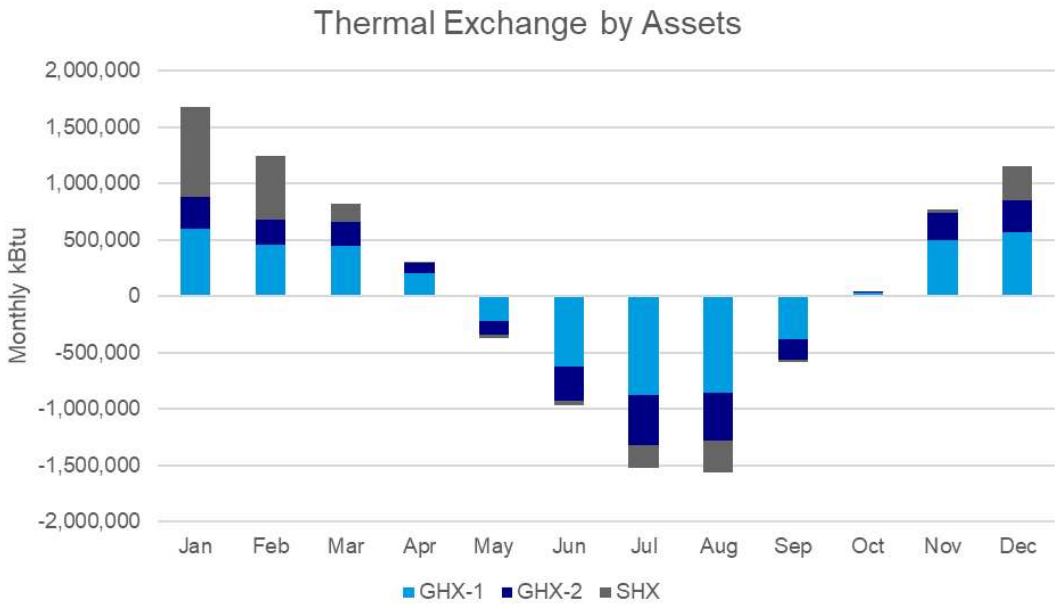
Building Connections – 22
Number Bores – 72
Large WWHX System – 16" Pressure Main Tap
100% Commercial DHW with WWHP's
100% Residential DHW with Desuperheaters

Single Pipe Ambient Loop
Energy Center/Wastewater Heat Exchange
Bore Fields

Salas O'Brien

West Loop Optimized Flow Diagram





- Min loop temperature during heating season > 35˚F
- Max loop temperature during cooling season < 85˚F
- Designed so the max change in temperature between energy sources is 5˚F
- Ambient loop flow rate modulated based on maintaining a Δ5˚ to meet the building loads

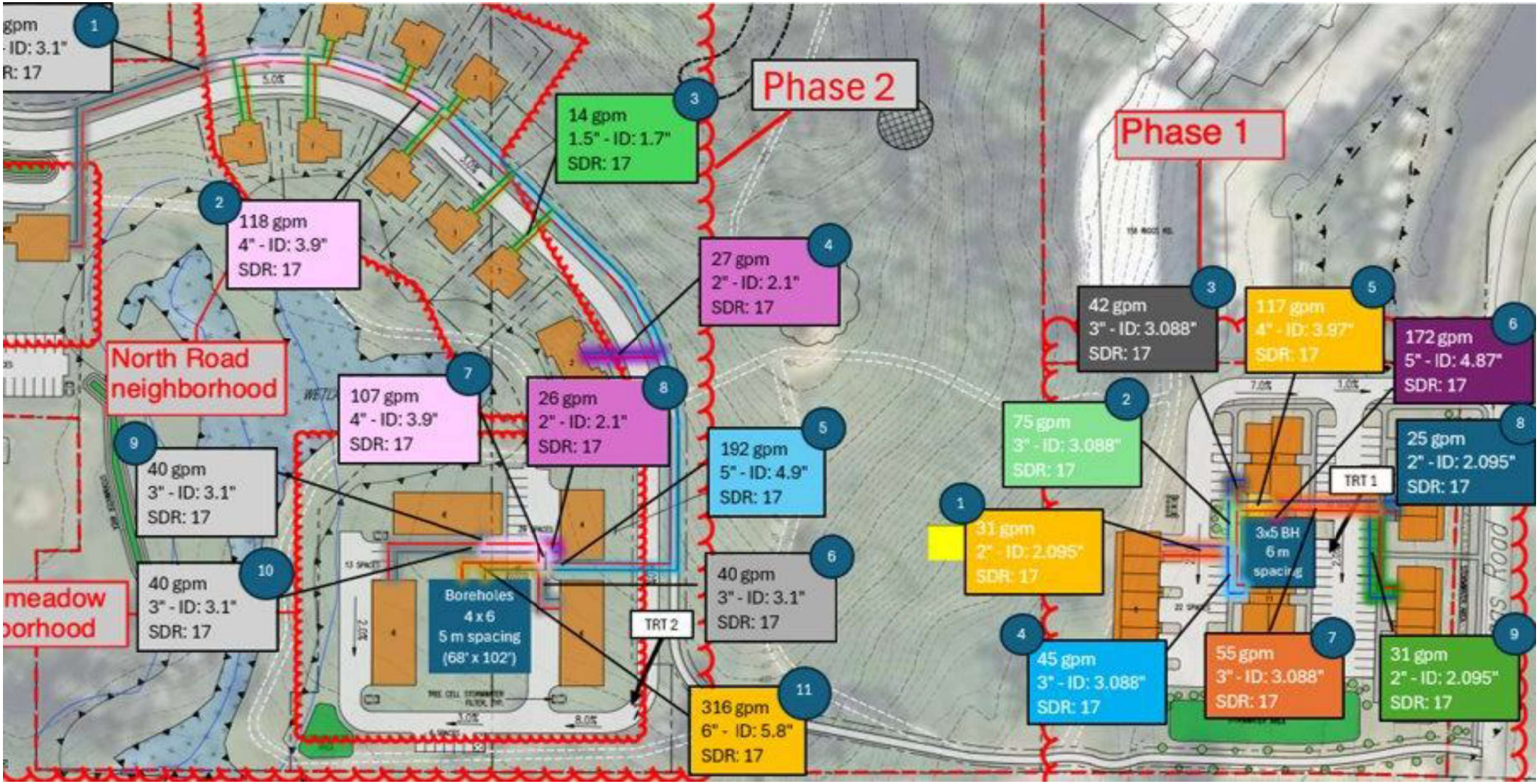
Salas O'Brien

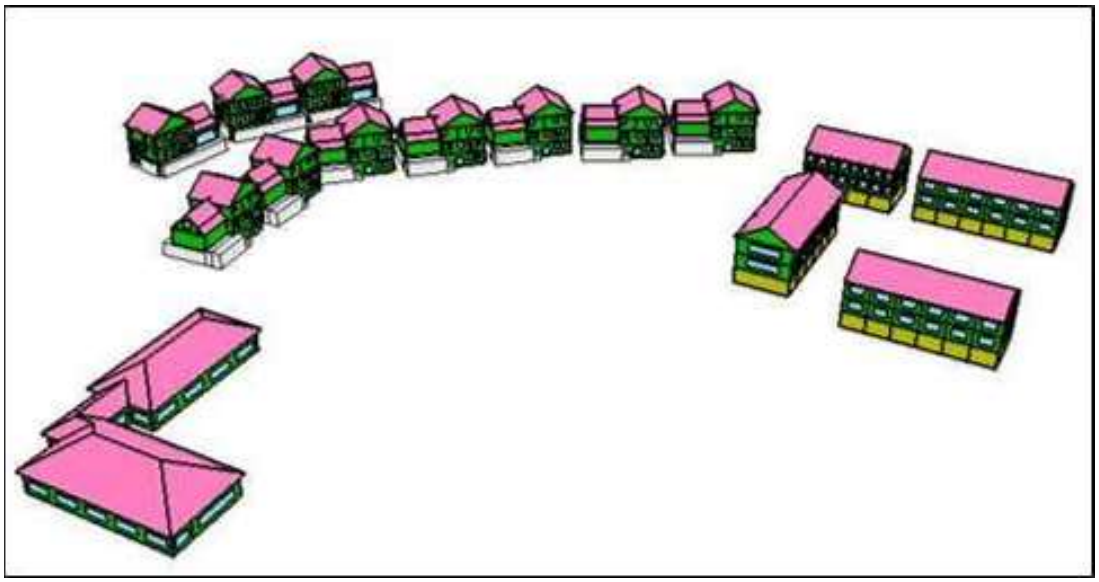
Brian Urlaub
Brian.Urlaub@salasobrien.com

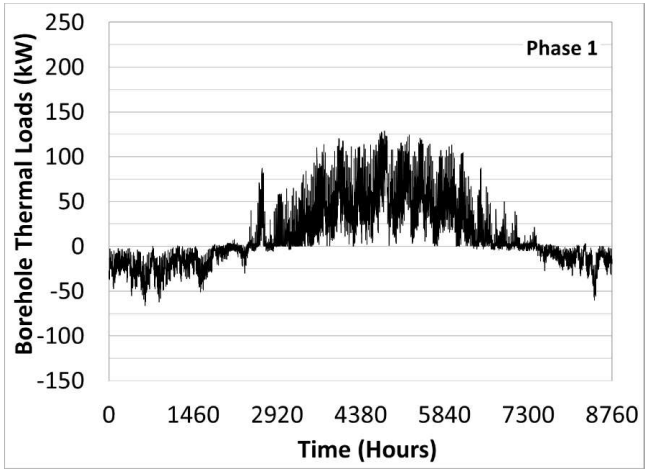
Thank You for your Participation!

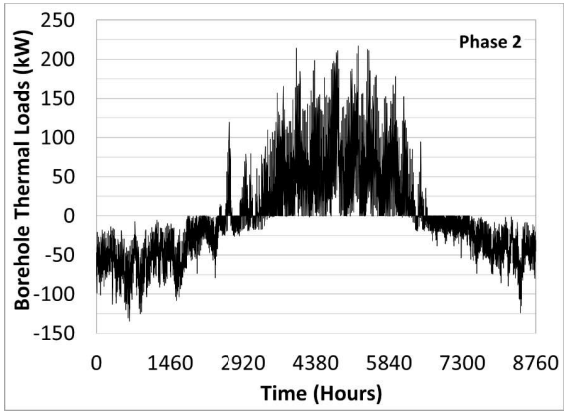
TENs or Stand-Alone?

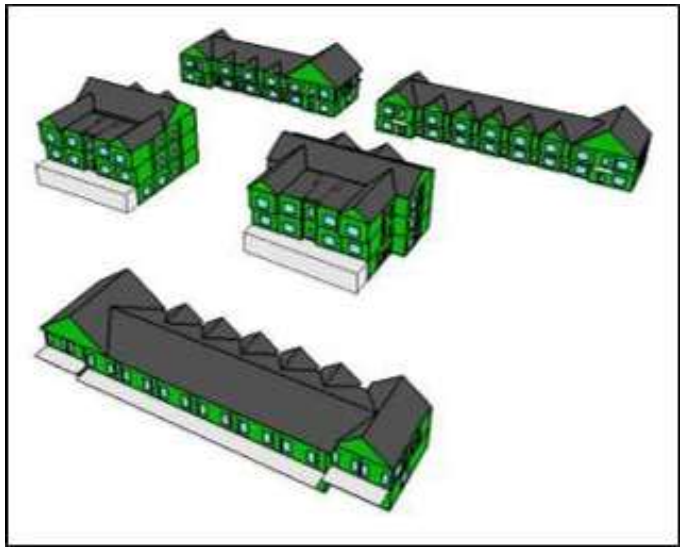
Vermont Gas Services
March 16, 2026

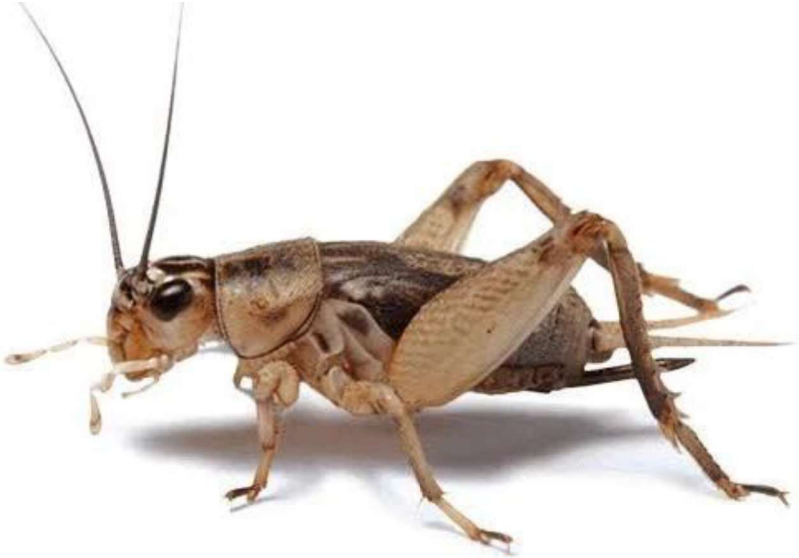

Phase 2
Phase 1
North Road neighborhood
meadow
oorhood
1
gpm
ID: 3.1"
R: 17
2
118 gpm
4" - ID: 3.9"
SDR: 17
3
14 gpm
1.5" - ID: 1.7"
SDR: 17
4
27 gpm
2" - ID: 2.1"
SDR: 17
5
192 gpm
5" - ID: 4.9"
SDR: 17
6
40 gpm
3" - ID: 3.1"
SDR: 17
7
107 gpm
4" - ID: 3.9"
SDR: 17
8
26 gpm
2" - ID: 2.1"
SDR: 17
9
40 gpm
3" - ID: 3.1"
SDR: 17
10
40 gpm
3" - ID: 3.1"
SDR: 17
11
316 gpm
6" - ID: 5.8"
SDR: 17
Boreholes
4 x 6
5 m spacing
(68' x 102')
TRT 2
1
31 gpm
2" - ID: 2.095"
SDR: 17
2
75 gpm
3" - ID: 3.088"
SDR: 17
3
42 gpm
3" - ID: 3.088"
SDR: 17
4
45 gpm
3" - ID: 3.088"
SDR: 17
5
117 gpm
4" - ID: 3.97"
SDR: 17
6
172 gpm
5" - ID: 4.87"
SDR: 17
7
55 gpm
3" - ID: 3.088"
SDR: 17
8
25 gpm
2" - ID: 2.095"
SDR: 17
9
31 gpm
2" - ID: 2.095"
SDR: 17
3x5 BH
6 m
spacing
TRT 1




Phase 1
Borehole Thermal Loads (kW)
250
200
150
100
50
0
-50
-100
-150
0
1460
2920
4380
5840
7300
8760
Time (Hours)


Phase 2
Borehole Thermal Loads (kW)
250
200
150
100
50
0
-50
-100
-150
0
1460
2920
4380
5840
7300
8760
Time (Hours)






PIVOT!

Lennar will build 1,500 new Colorado homes with geothermal heat pumps

The homebuilder is partnering with Dandelion Energy to install the tech, which is efficient but expensive — unless it's built into new homes from the start.

A drilling rig drills boreholes in the Ken-Caryl Ranch development in Littleton, Colorado. The boreholes are part of the Dandelion Energy geothermal ground-source heat pumps being integrated into newly built homes from Lennar. (Dandelion Energy)

- Collaboration with Dandelion Energy
- Utility owns the loops and charges customer a $25-$35 per unit monthly access fee
- Building owner owns the ground source heat pump
- Energy costs and loop access fee are folded into resident's rent and is less expensive than the air source heat pump alternative.

- Cost is acceptable to the customer
- Opportunity remains to provide gas utility staff with real world training opportunities in geo
- Build comfort with geothermal in our developer and contractor communities
- Provide multiple paths to geo for different customer types

Thank You!

Morgan Hood, Director of Product Management

mhood@vermontgas.com

Thermal Energy Neighborhoods

Cost Reductions Logistical Simplicity: Unlocking Geothermal for Production Homebuilders

Wyatt Roberts
SVP of Construction,
Dandelion Energy

dandelion

Dandelion Geothermal

Executing geo at builder production scale

Bethesda, MD

35 townhomes in a new luxury brownstone development with EYA

Denver, CO

1,500+ homes across the Denver metro area with Lennar

Boyds, MD

220+ single family home community with Lennar

Princeton, NJ

30 future homes coming to Magnolia Square!

Join builders making the move to geothermal

“Our collaboration with Dandelion Energy brings **innovative geothermal technology** into our homes—offering homeowners a **cleaner, more efficient way to heat and cool** their homes, while **reducing long-term costs** and future-proofing their investment. It supports our broader commitment to making **high-quality, attainable housing more accessible**.”

Stuart Miller, Executive Chairman & Co-CEO
Lennar Corporation

See Why Dandelion is Trusted By Homeowners & Home Builders Nationwide

THE NEIGHBORHOODS OF EYA

SUMMIT PROPERTIES

LENNAR

Toll Brothers
America's Luxury Home Builder™

Discovery LAND COMPANY

TRUMARK HOMES

dandelion

Why Choose Individual Ground Loops?

Making geo possible for residential builders

1. **COST**
   - ~30% cheaper to install than network geo

2. **SIMPLICITY & LOGISTICS**
   - Single-day bore per home, before vertical construction
   - Makes builders more competitive in land deals
   - No gas extension, easements, or community construction needed
   - No HOA ownership or central maintenance required

3. **CONSUMER BENEFITS**
   - Lower operating costs with reduced pumping power
   - No risk of neighborhood-wide service outages

Sometimes a picture is worth 1000 words

Network vs. Direct

For new constructions

1 Maryland Residential New Development

	Direct Loops	Network Loop Est.
Vertical Drilling + Tie-In	$2,120,307	$1,590,230
Horizontal Piping & Facilities	0	$1,354,641
Net Cost	**$2,120,307**	**$2,944,871**

Additional Network Loop Maintenance
- Circulator
- Expansion tanks
- HVAC Controls

2 New England Residential New Development

	Dandelion Direct Loop	Network Loop
Vertical Drilling	$360,102	$310,425
Horizontal Piping & Facilities	$20,100	$217,840
Net Cost	**$380,202**	**$528,265**

Let’s Dig In.

The smartest path to geothermal → discussion time.

Wyatt Roberts
SVP of Construction
Email: Wyatt@dandelionenergy.com
Cell: (845) 224-7877

dandelion

TENs vs. Individual Building Conversions

Moderator: Ryan Carda / *Midwest Geothermal*

Panel: Sue Dougherty / *NYSERDA*

Brian Urlaub / *Salas O'Brien*

Morgan Hood / *VGS*

Wyatt Roberts / *Dandelion Energy*