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Residential Gas Heat Pumps- The Time has Come

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Ryan Kerr

Director, Emerging Technologies

rkerr@gti.energy; 847-768-0941

Heat Pumps: Definitions

- **Heat Pump:** Moves heat from one place to another
  - In the winter, we move heat from outside-in
  - In the Summer, we move heat from inside-out
- **Thermally-driven Heat Pump:** Use heat instead of an electric compressor as energy driver
  - Terminology is evolving, aka:
    - *Gas-fired Heat Pumps (GHP)*
    - Fuel-Fired Heat Pumps (FFHP)
  - For heating, combination space and water heating application resemble boiler-based systems

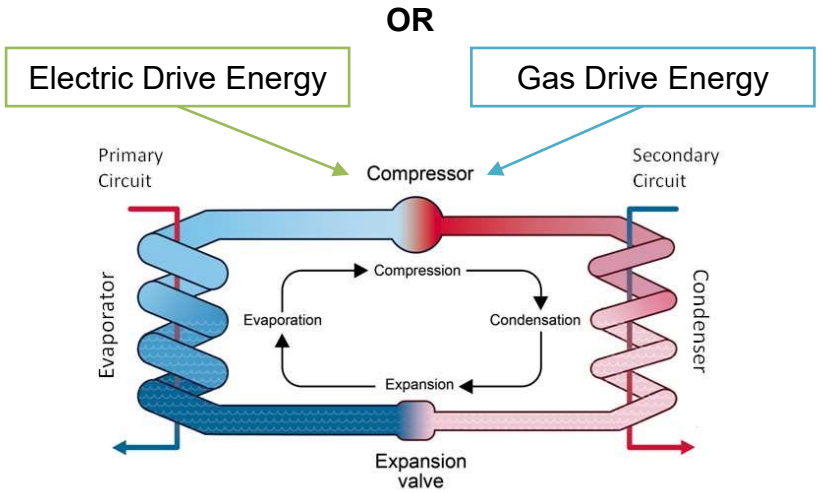


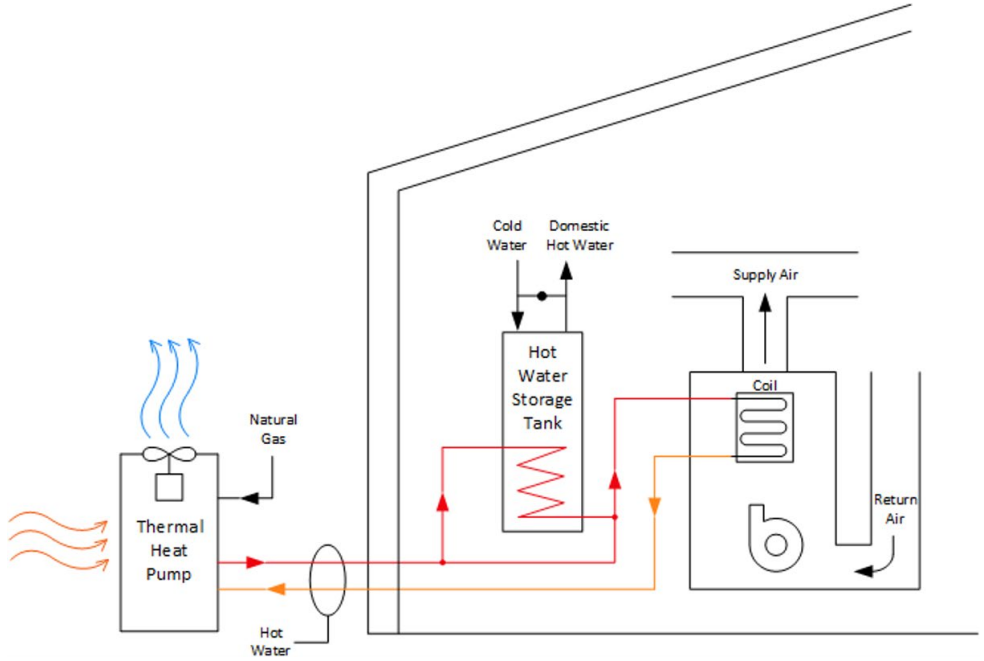
Image Source: ResearchGate

Gas Heat Pumps (GHP): Motivation

Why *Gas* Heat Pumps?

- *Best-in-class operating efficiency*
  - Condensing furnace 95-98 AFUE vs Anesi GHP 140 AFUE
  - GTI Energy field demos showed 33-46% therm savings (space and water heat)
- Systems operate during the coldest days, meeting the heating load without back-up resistance heating
- Commonly use natural refrigerants with low/no GWP
- 30-50% reduction in operating GHG emissions, with combustion outside

Typical Residential 'Combi' Installation



Mass Market Applications

Targeting regions with 4,000+ HDDs. The Anesi has the capacity to serve ≈50% of gas & propane heated single-family homes in North America (and many larger multi-family units).

Gas Heat Pumps: Market Availability

- **Commercial** (products on the market for 10+ years)
  - Robur sells several small commercial market units- space conditioning and water heat (think central multi-family water heat)
  - Yanmar offers VRF heating/cooling units for commercial applications
  - Vicot and others have systems on or near market
- **Residential**
- GTI Energy is working with Thermolift, Homy/Vicot, and Robur to lab test, ready, and deploy residential space heating/combi units
- GTI Energy is working with HeatAmp to develop a residential water heater
- *After ten years of technology and product development, the SMTI Anesi system is hitting the market now.*

Image Source: SMTI Anesi

Residential Gas Heat Pump Controlled Demonstration Program: **Process**

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Lab Performance and Reliability Evaluation

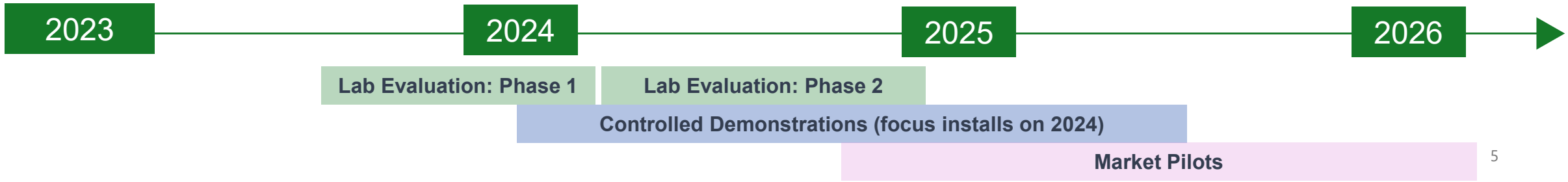
- Certified, warrantied units
- QA/QC testing for production units
- Accelerated life testing
- Simulated use testing
- Go/No-Go for Demos (after 9 weeks testing)

Controlled Demonstrations

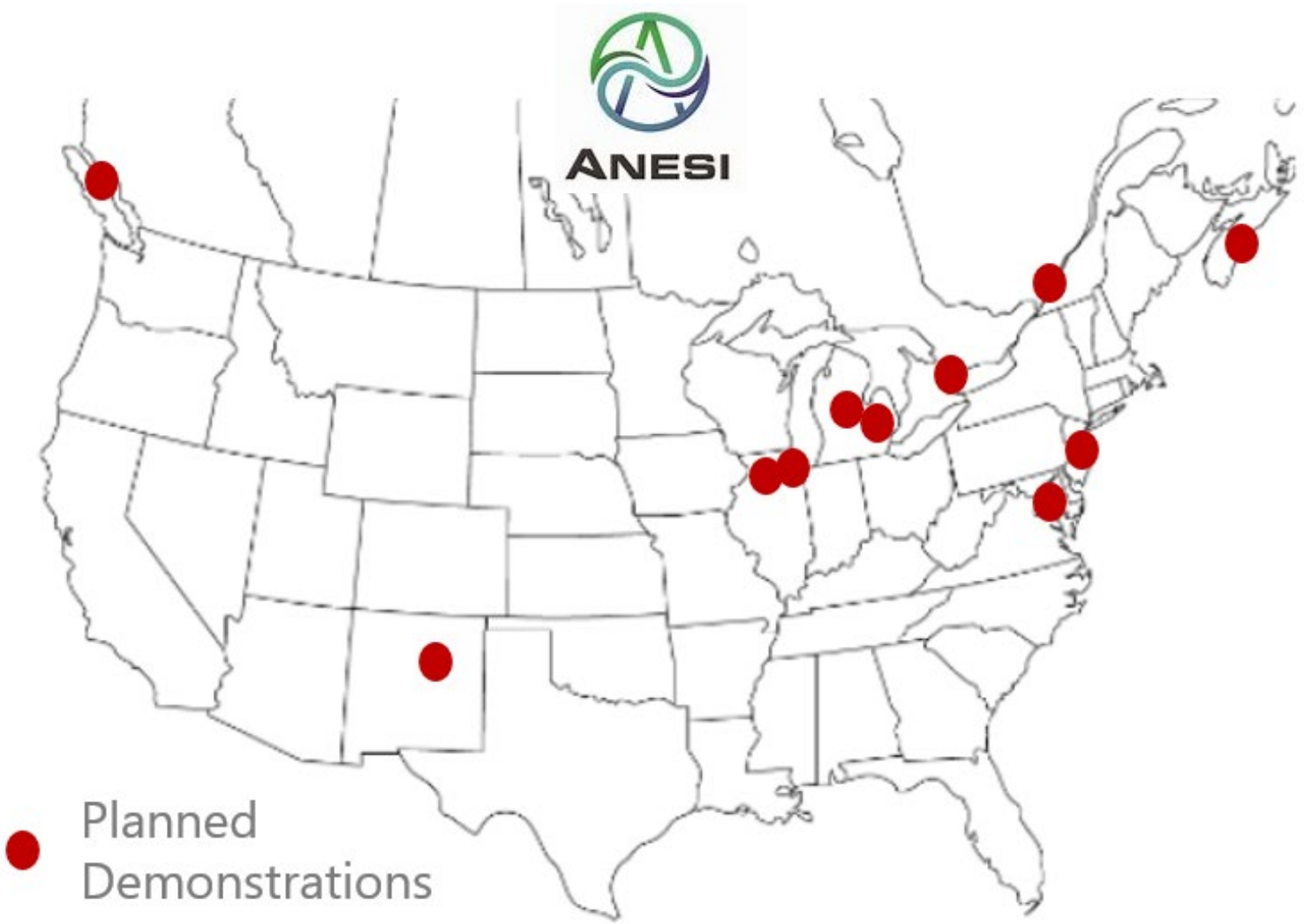
- Real-world field installations in sponsor territories (100+ planned)
- Heavy focus on developing distribution and installer network
- Detailed quantitative and qualitative assessments
- Go/No-Go for Pilots

Early Adopter Pilots

- Higher volume
- More traditional EE program model- mid or downstream incentives
- Continued focus on developing distribution, sales, and service



Residential Gas Heat Pump Demonstration: **Sponsors and Regions**



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Region Round-up

Nicor Gas

- Planning up-to **30 residential field demo units**
- Training- Anesi installs planned for Gas Town, College of DuPage and CEDA- Demo installer training next month at GTI
- Commercial demos underway with Illinois National Guard

PEOPLES GAS / NORTH SHORE GAS

- Planning **3 residential field demo units**
- Training Center – Anesi install planned at Training Center- Demo installer training next month at GTI

DTE Energy

- **3 residential field demo units**
- Supported Market Assessment
- Lab Testing Thermolift and Robur
- 1 commercial Robur and 2 Thermolift field demos planned

Consumers Energy

Count on Us®

- **3 residential field demo units**
- 1 commercial Robur demo planned

*While not participating in Res Demo, SEMCO supported Market Assessment and is pursuing GHP trainings and demos

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GTI Energy develops innovative solutions that transform lives, economies, and the environment

Questions?

Ryan Kerr
Director, Emerging Technologies
rkerr@gti.energy; 847-768-0941