

Geothermal Energy Study Technical Services

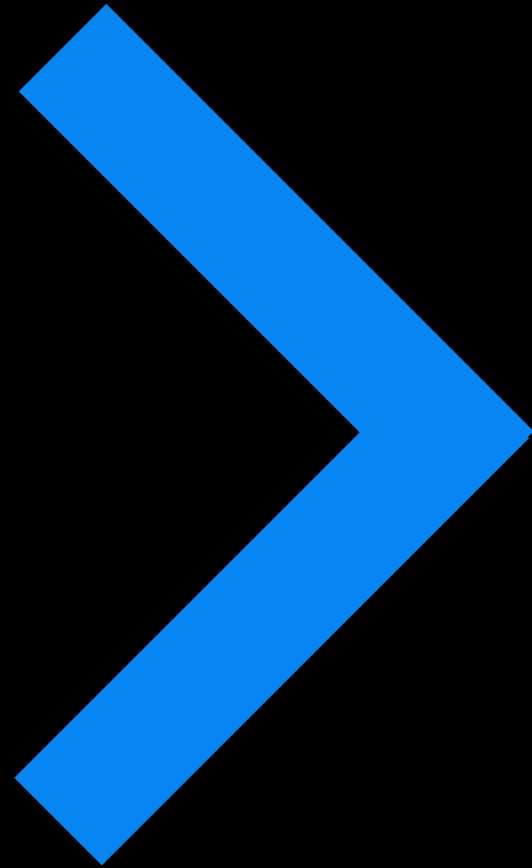
MES/MEA



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Agenda

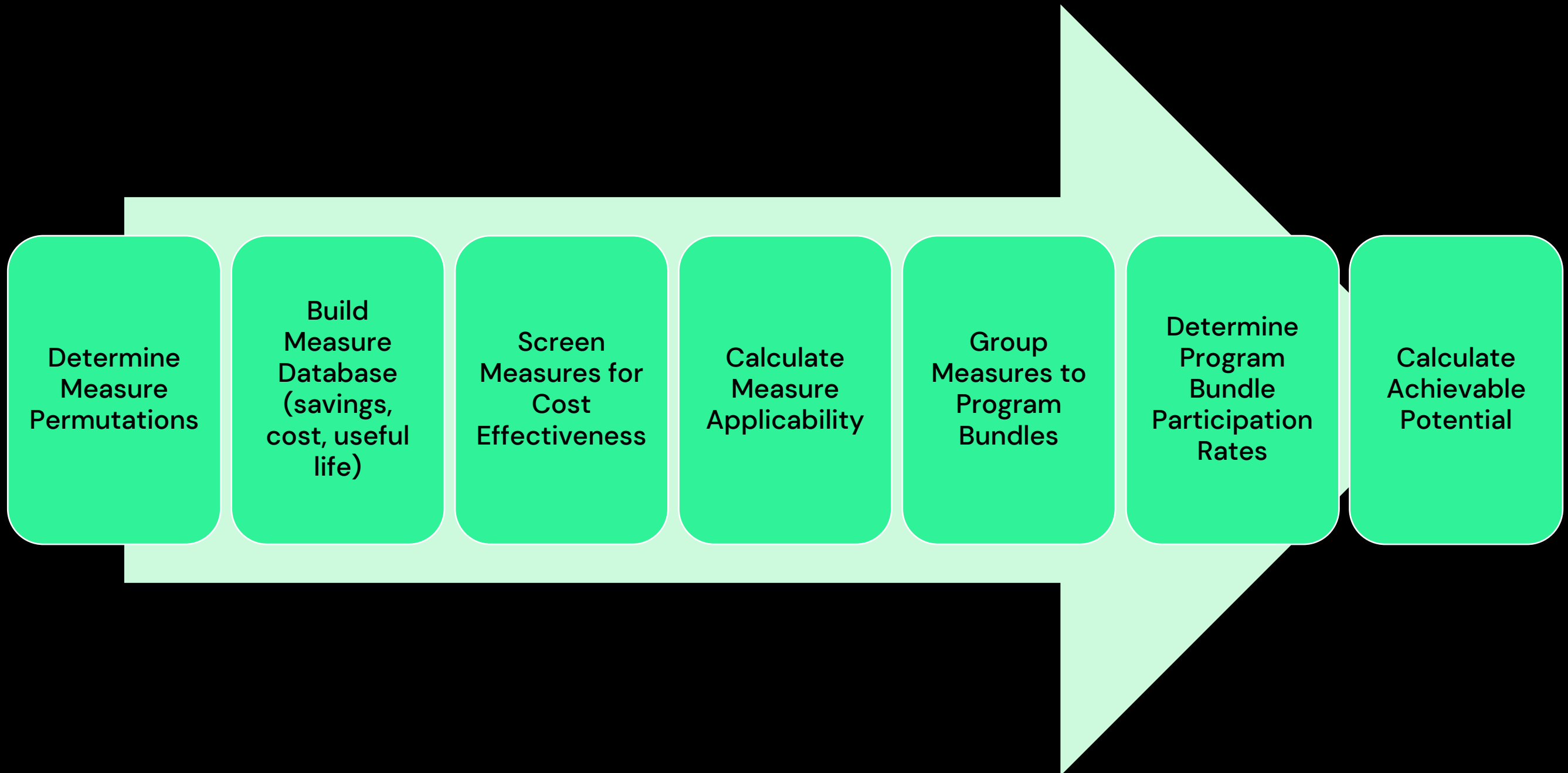
- Task 2/4 overview
- Key assumptions
- Outstanding questions
- Proposed measure permutations

Task 2/4 Overview

- Task 2: Cost and feasibility of increasing the use of geothermal heating and cooling systems in the state
- Task 4: Potential for geothermal heating and cooling systems to reduce peak electricity demand

The key questions for each of these tasks requires an achievable potential study

Achievable Potential Study Process



Key Assumptions (1)

- An ASHP will be the baseline systems for new construction for residential and commercial
 - This is based on the Mid-Atlantic & Illinois TRM baseline assumptions for calculating GSHP savings
- Existing buildings with natural gas heating won't be considered for GSHPs
 - The language of the house bill excludes natural gas systems from consideration

(3) [replaces or displaces inefficient space or water heating systems whose primary fuel is electricity or a nonnatural gas fuel source;

Key Assumptions (2)

- The following baseline types of equipment will be assumed for existing commercial buildings
 - Packaged rooftop units with electric resistance heat
 - Packaged rooftop units with air source heat pump heating
- The following baseline types of equipment will be assumed for existing residential buildings
 - Central Air Conditioner (AC) with propane heat
 - Central AC with electric resistance heat
 - Heat pumps

Key Assumptions (3)

- For existing stock replacement, we will assume an early replacement baseline condition
 - Installing a GSHP takes thought and care, not something that is commonly done when replacing a burned-out system
- GSHPs will be explored with and without desuperheaters
 - Could change GSHP economics so looking at it both ways
- Open loop GSHPs will not be considered
 - Very small potential compared to closed loop systems

Questions

- Do you know of any Maryland or regional specific sources on cooling/heating system breakdowns for residential and commercial?
 - We have a 2010 Maryland baseline study that has residential data
 - Other than that we are using Residential Energy Consumption Survey (RECS) / Commercial Building Energy Consumption Survey (CBECS) data to fill in the gaps

Proposed Measure Permutations – Residential

Sector	Installation Type	Building Type	GSHP Type	Baseline HVAC System	Water Heating
Residential	Existing Stock, Early Replacement	Single Family	Closed Loop	Electric Resistance Heat, Central AC	Desuperheater
Residential	Existing Stock, Early Replacement	Single Family	Closed Loop	ASHP	Desuperheater
Residential	New Construction	Single Family	Closed Loop	ASHP	Desuperheater
Residential	Existing Stock, Early Replacement	Single Family	Closed Loop	Propane Furnace Heat, Central AC	Desuperheater
Residential	Existing Stock, Early Replacement	Multifamily	Closed Loop	Electric Resistance Heat, Central AC	Desuperheater
Residential	Existing Stock, Early Replacement	Multifamily	Closed Loop	ASHP	Desuperheater
Residential	New Construction	Multifamily	Closed Loop	ASHP	Desuperheater
Residential	Existing Stock, Early Replacement	Multifamily	Closed Loop	Propane Furnace Heat, Central AC	Desuperheater
Residential	Existing Stock, Early Replacement	Single Family	Closed Loop	Electric Resistance Heat, Central AC	No Desuperheater
Residential	Existing Stock, Early Replacement	Single Family	Closed Loop	ASHP	No Desuperheater
Residential	Existing Stock, Early Replacement	Single Family	Closed Loop	Propane Furnace Heat, Central AC	No Desuperheater
Residential	Existing Stock, Early Replacement	Multifamily	Closed Loop	Electric Resistance Heat, Central AC	No Desuperheater
Residential	Existing Stock, Early Replacement	Multifamily	Closed Loop	ASHP	No Desuperheater
Residential	Existing Stock, Early Replacement	Multifamily	Closed Loop	Propane Furnace Heat, Central AC	No Desuperheater

Proposed Measure Permutations – Commercial New Construction

Sector	Installation Type	Building Type	GSHP Type	Baseline HVAC System	Water Heating
Commercial	New Construction	Education - Pri/Sec School	Closed Loop	ASHP	Desuperheater
Commercial	New Construction	Education – University	Closed Loop	ASHP	Desuperheater
Commercial	New Construction	Office	Closed Loop	ASHP	Desuperheater
Commercial	New Construction	Storage – Conditioned	Closed Loop	ASHP	Desuperheater
Commercial	New Construction	Retail	Closed Loop	ASHP	Desuperheater
Commercial	New Construction	Assembly	Closed Loop	ASHP	Desuperheater
Commercial	New Construction	Religious Worship	Closed Loop	ASHP	Desuperheater
Commercial	New Construction	Lodging	Closed Loop	ASHP	Desuperheater
Commercial	New Construction	Grocery	Closed Loop	ASHP	Desuperheater
Commercial	New Construction	Restaurant	Closed Loop	ASHP	Desuperheater

Proposed Measure Permutations – Commercial Existing Stock

Sector	Installation Type	Building Type	GSHP Type	Baseline HVAC System	Water Heating
Commercial	Existing Stock, Early Replacement	Education - Pri/Sec School	Closed Loop	ASHP	No Desuperheater
Commercial	Existing Stock, Early Replacement	Education – University	Closed Loop	ASHP	No Desuperheater
Commercial	Existing Stock, Early Replacement	Office	Closed Loop	ASHP	No Desuperheater
Commercial	Existing Stock, Early Replacement	Storage – Conditioned	Closed Loop	ASHP	No Desuperheater
Commercial	Existing Stock, Early Replacement	Retail	Closed Loop	ASHP	No Desuperheater
Commercial	Existing Stock, Early Replacement	Assembly	Closed Loop	ASHP	No Desuperheater
Commercial	Existing Stock, Early Replacement	Religious Worship	Closed Loop	ASHP	No Desuperheater
Commercial	Existing Stock, Early Replacement	Lodging	Closed Loop	ASHP	No Desuperheater
Commercial	Existing Stock, Early Replacement	Grocery	Closed Loop	ASHP	No Desuperheater
Commercial	Existing Stock, Early Replacement	Restaurant	Closed Loop	ASHP	No Desuperheater

Proposed Measure Permutations – Commercial Existing Stock

Sector	Installation Type	Building Type	GSHP Type	Baseline HVAC System	Water Heating
Commercial	Existing Stock, Early Replacement	Education - Pri/Sec School	Closed Loop	AC w/ Electric Resistance	No Desuperheater
Commercial	Existing Stock, Early Replacement	Education – University	Closed Loop	AC w/ Electric Resistance	No Desuperheater
Commercial	Existing Stock, Early Replacement	Office	Closed Loop	AC w/ Electric Resistance	No Desuperheater
Commercial	Existing Stock, Early Replacement	Storage – Conditioned	Closed Loop	AC w/ Electric Resistance	No Desuperheater
Commercial	Existing Stock, Early Replacement	Retail	Closed Loop	AC w/ Electric Resistance	No Desuperheater
Commercial	Existing Stock, Early Replacement	Assembly	Closed Loop	AC w/ Electric Resistance	No Desuperheater
Commercial	Existing Stock, Early Replacement	Religious Worship	Closed Loop	AC w/ Electric Resistance	No Desuperheater
Commercial	Existing Stock, Early Replacement	Lodging	Closed Loop	AC w/ Electric Resistance	No Desuperheater
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