

LESSONS LEARNED THROUGH IMPLEMENTING NH'S THERMAL RPS for GEOHERMAL

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Lessons Learned:

Independent Monitor Perspective

1. Need buy-in from installers

- Installers need to see benefit and be provided with tools to make process easy.

2. NH Metering methods seem appropriate

- Heat pump specifications and metered runtimes for small systems.
- Heat meter for large systems.

3. Make process more efficient:

- Streamline application process
- Work to get 'meter' data (on/off, EWT, LWT) from onboard systems like WaterFurnace Symphony

Lessons Learned:

Independent Monitor Perspective

Need buy-in from installers

1. Plan for installation prior to construction
 - Wiring and internet connections
 - Large systems need sufficient pipe runs and location to meet heat meter requirements.
2. Make metering systems agnostic to system performance.
 - Goal is to meter heat from ground
 - Data may not represent system efficiency accurately, so avoid presenting data as COP – especially with small systems

Lessons Learned:

Independent Monitor Perspective

Metering methods seem appropriate
(perhaps adjust small-to-large threshold upward)

1. Small systems meter runtimes (heating)
 - Heat pumps need AHRI certifications
 - Sensors should be clamp-on and installed in heat pump (not electrical panel)
2. Large systems require Heat Meter
 - “Class 3K” temperature sensors, ground loop ΔT should be greater than 5.4°F (3°C).
 - Examples: Onicon Systems 10 and 40 (smaller)

IM Lessons: Metering (small)

“Metered” with calibrated temperature sensors and flow meter

91 days starting January 01, 2016	
	Heating
Degree Days	2,172
Geoexchange	9,583,417
Total kWh	1,094
System Operating Cost	\$219

“Metered” with AHRI Performance Data and measured Runtimes

	Current Conditions				Runtimes
	EWT	LWT	On/ Off	MBtuH	91 days starting 01, 2016
Heat Pump 1	60.26° F	60.51° F	Off	0.0	550 hours

HC=22,000 Btu/h
COP = 4.8

$$Q = [HC * (COP - 1) * t] / COP = 9,579,167 \quad 0.04\% \text{ error}$$

USE WITH CAUTION: need to look at data from more sites!!

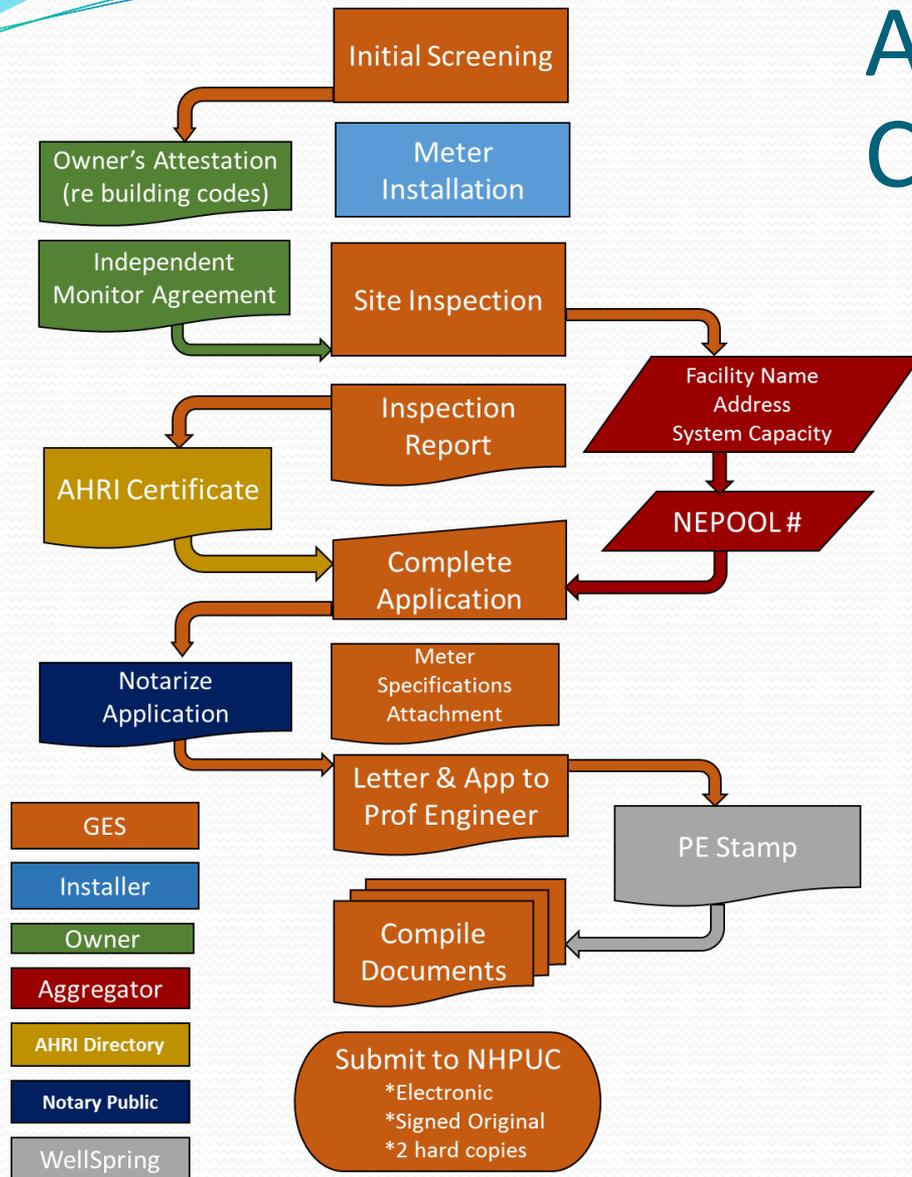
Lessons Learned:

Independent Monitor Perspective

Make process more efficient

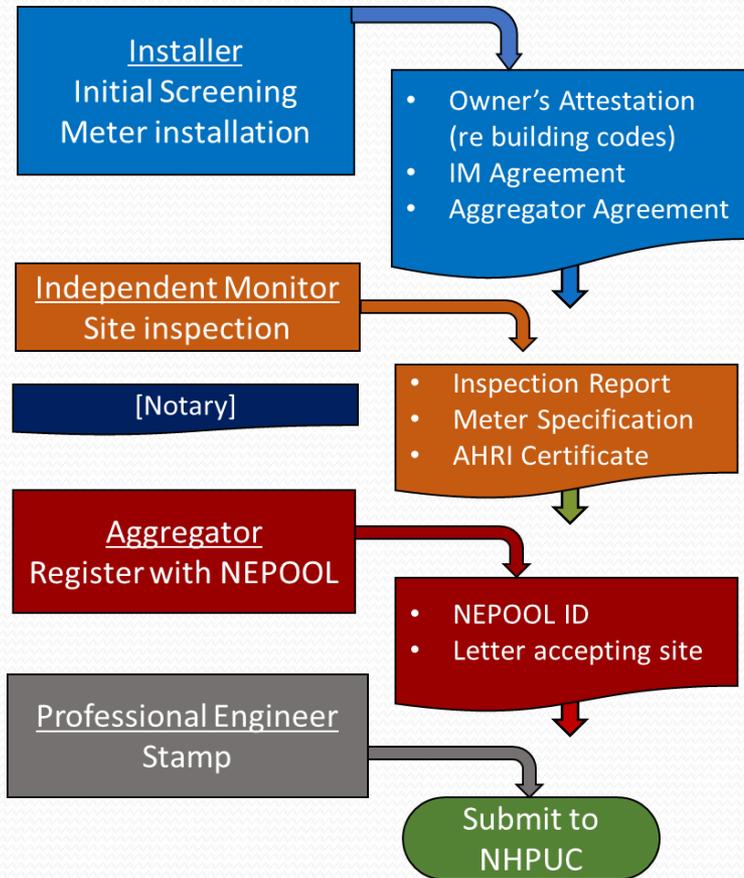
1. Streamline application process
 - Standardized process with one-way flow of documents and approvals.
 - Use web-based method that allows for uploading documents and digital signatures.
2. Capitalize on existing sensors (small systems)
 - Work with manufacturers to have essential data (heat pump on/off, EWT, LWT) 'pushed' to Independent Monitor.

Application Process: Current



- Paper based
- Non-linear
- Inefficient
- Requires input from 6 entities

Application Process: Recommended



- Linear process
- Installer initiates standardized process
- Electronic, cloud-based, append documents
- Standardize initial contract
- Electronic notary options?

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