

NEW HAMPSHIRE'S THERMAL RENEWABLE PORTFOLIO STANDARD PROVISIONS Geothermal

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Renewable Portfolio Standard (RPS) Legislation

- Original Renewable Energy Certificate (REC) program enacted in July 2007. RSA 362-F.
 - Established requirement for 4 classes
- Thermal Sub-Class created through SB 218, effective June 2012.
 - *Required NHPUC to adopt procedures for the **metering**, verification, and reporting of useful thermal energy output.* RSA 362-F:13 VI-a

Key Provisions - Definition

Useful Thermal Energy means:

“renewable energy derived from Class I sources that can be metered and is delivered in NH to an end user in the form of direct heat, steam, hot water, or other thermal form that is used for heating, cooling, humidity control, process use or other valid thermal end use requirements and for which fuel or electricity would otherwise be consumed.” (RSA 362-F:2, XV-a.)

New Hampshire's RPS Obligations

Calendar Year	Total Requirement	Total Class I	Thermal Class I	Class II	Class III	Class IV
2008	4.00%	0.00%	0.00%	0.00%	3.50%	0.50%
2009	6.00%	0.50%	0.00%	0.00%	4.50%	1.00%
2010	7.54%	1.00%	0.00%	0.04%	5.50%	1.00%
2011	9.58%	2.00%	0.00%	0.08%	6.50%	1.00%
2012	5.55%	3.00%	0.00%	0.15%	1.40%	1.00%
2013	5.80%	3.80%	0.00%	0.20%	0.50%	1.30%
2014	7.20%	5.00%	0.40%	0.30%	0.50%	1.40%
2015	8.30%	6.00%	0.60%	0.30%	0.50%	1.50%
2016	8.50%	6.20%	0.60%	0.30%	0.50%	1.50%
2017	17.60%	7.80%	1.40%	0.30%	8.00%	1.50%
2018	18.50%	8.70%	1.50%	0.30%	8.00%	1.50%
2019	19.40%	9.60%	1.60%	0.30%	8.00%	1.50%
2020	20.30%	10.50%	1.70%	0.30%	8.00%	1.50%
2021	21.20%	11.40%	1.80%	0.30%	8.00%	1.50%
2022	22.10%	12.30%	1.90%	0.30%	8.00%	1.50%
2023	23.00%	13.20%	2.00%	0.30%	8.00%	1.50%
2024	23.90%	14.10%	2.00%	0.30%	8.00%	1.50%
2025 and thereafter	24.80%	15.00%	2.00%	0.30%	8.00%	1.50%

Measuring and Metering Geothermal Energy

- Boundary for thermal measurement:
 - Before delivery to distribution
- Measuring thermal energy:
 - Large Systems: based on flow, temperature, and specific heat
 - Small Systems: based on operating hours and HC & COP
- Metering Options:
 - Must meet accuracy of :
 - EN1434 standard for water systems; or
 - $\pm 5\%$ or better; RECs discounted; or
 - Alternative methodology
- Small/Large Threshold - 200,000 Btu/hr of heat input

T-REC Calculation

- Measure thermal output
- Discount for operating energy and thermal energy storage losses for large sources
 - Geothermal: 3.6% or
 - Actual Metering of Parasitic Load
- Convert MMBtu to MWh:
 - $1 \text{ MWh} = 3.412 \text{ MMBtu}$
- RECs reported to NEPOOL GIS in MWh

Verifying and Reporting Geothermal Energy

- Professional Engineer must attest to the thermal energy metering/measurement methodology
- Independent Monitor (IM) qualifications:
 - Professional Engineer, or
 - IGSHPA Accredited Geothermal Installer
- IM must inspect facility initially
- IM verifies and reports thermal output to NEPOOL GIS

Summary of Geothermal Facilities

(as of December 31, 2016)

REC #	Facility Name	Approval Date	BTU/hr.	MW equ.
15-056	Krinsky	12/1/2014	163,000	0.048
15-067	Mack	8/5/2014	54,700	0.016
15-481	Piehler	11/13/2015	54,500	0.016
15-482	Neubauer	11/13/2015	55,300	0.016
15-483	NCES	11/13/2015	93,000	0.027
16-222	233 Vaughan St. Condominiums	2/10/2016	642,000	0.189
16-691	Brown	6/27/2016	42,100	0.012
16-692	Christian	6/27/2016	29,700	0.009
Total			1,134,300	0.33

Benefits of Renewable Geothermal Program

- Provides fuel diversity and displaces fossil fuels
- Use of local renewable fuels and resources
- Keeps energy and investment dollars in the State
- Provides an additional revenue stream for participants
- Increased efficiency from newer, renewable technology

Lessons Learned/Next Steps

- **Lessons Learned:**

- RPS programs CAN include renewable thermal
- Administration, metering, measurement and verification can be complex

- **Next Steps**

- Develop more streamlined methods to accurately measure and verify while maintaining integrity
- Modify thermal application to assist review and approval
- Explore the inclusion of geothermal cooling as a renewable thermal resource

Contact info

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