

Vacuum Steam Heating Technology

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Description of Technology		Energy Saving Opportunity	
<p>Applied Engineering Consulting is the promoter for Vacuum Steam Heating (VSH) Technology intended to replace single pipe steam heating systems in residential and light commercial applications. Common practice in industry generally calls for complete steam to hot water conversion. While this practice may be optimal for energy efficiency, costs to do so generally prohibit a customer from moving forward. VSH technology claims to address this issue with flexible retrofit options while still yielding energy savings.</p>	Sector(s):	<input checked="" type="checkbox"/> Residential	<input type="checkbox"/> Commercial & Industrial
	Applicability Criteria:	Buildings with single pipe steam heating system.	
	Efficiency Improvement:	Highly variable	
	Energy (%) Savings Potential:	Highly variable	
	Demand (%) Reduction Potential:	Highly variable	
	Strengths	Weakness	
<ul style="list-style-type: none"> Marginally higher energy efficiency with VSH due to reduction in operating temperatures while maintaining high differential pressure across the system. Facilitate use of low mass hydronic radiators replacing high mass cast iron radiators with air vents to improve heat transfer efficiency. Less maintenance compared to conventional single pipe steam heating systems due to water hammer, faulty operation of steam traps, uneven temperature due to high thermal mass of cast iron radiators, etc. 	<ul style="list-style-type: none"> Solution proposed here is a compromise choice to replacing with hot water systems. Slight electric energy penalty due to vacuum pump operation. Capital cost to realize energy savings tested under various scenarios resulted in payback ranging from 25 to 35 years making it difficult to pass BCR screening needed to qualify for utility incentives. Pilot test did not take into account any additional costs associated with compliance to local building and plumbing codes. Any additional costs would extend the payback time even longer. 		
Third Party Analysis/ Previous MTAC Reviews	Suppliers Known to MTAC	MTAC Status	
National Grid conducted pilot study at a residential facility working with the vendor. RISE Engineering published results from the pilot study. Above comments were adapted from the study report.	Applied Engineering Consulting	Acknowledged to have energy savings potential but long payback based on findings from pilot study.	
Market Development Issues			
Cost:	System costs for various configurations tested ranged from \$4,850 to \$14,500.		
Market Risk and Barriers:	Education needed for installer.		
Time to Market:	Currently on market		
Simple Pay-back: (Years)	Dependent on heating system		
			