



From:
Market Opportunities for Commercial-Scale Heat Pump Water Heaters
in New York State:
Task 1 Report,
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Appendix 2

An Annotated Bibliography of resources on commercial scale heat pump water heaters.

ASHRAE, 1994. *Technical Service Bulletin: New Information on Service Water Heating. V. 10, #2.* ASHRAE, 1791 Tullie Circle, Atlanta, GA 30329

Five essays. Two deal with measured use patterns in commercial buildings and multifamily buildings, respectively. Another addresses a computer simulation developed for EPRI.

Caneta Research, Inc. *Guidelines for the Evaluation of Resource and Environmental Benefits of Heat Recovery Heat Pumps. Final Report, RP-807,* ASHRAE, 1791 Tullie Circle, Atlanta, GA 30329.

Primary focus is industrial processes such as drying processes and mechanical vapor recompression. However, the report includes a hospital kitchen application, a large water heating and air-conditioning application in a resort complex, and a chicken processing plant.

EPRI, *Commercial Heat Pump Water Heaters Applications Handbook*, 1990. Prepared by A.C. Shedd and D. W. Abrams. Electric Power Research Institute Report CU-6666s.

A thoroughly professional and well-written report on HPWH potential and applications. Unfortunately, availability to others than EPRI members who support that business line has been very spotty. Interested readers may want to begin with ASHRAE Short Course notes by A. Shedd, one of the authors of the EPRI report.

FEMP (Federal Energy Management Program, US DOE), 1997. *Commercial Heat Pump Water Heaters. Federal Technology Alert.* 28 pp. Available from http://www.eren.doe.gov/femp/prodtech/pdfs/FTA_HPWH.pdf
The best and most concise resource available. Overview of the technology, sizing, manufacturers, a case study, and other guidance.

FEMP (Federal Energy Management Program, US DOE), 1995. *Residential Heat Pump Water Heaters. Federal Technology Alert*, 32 pp. Available from http://www.eren.doe.gov/femp/prodtech/water_heat.html

Excellent review. Includes breakeven electricity costs for replacing resistive water heating, annual entering cold water temperatures by city, manufacturers, design guidance, etc.

Hiller, Carl. *Water Heating Technology Review and Competitive Technology Issues. Short Course Notes*. For information, contact author, chiller@davis.com, (530)758-3035.

These notes are largely a compilation of articles from EPRI "Electric Water Heating News." Hiller is assumed to have been the principal author.

Shedd, Alan. *Commercial Heat Pump Water Heaters – Technology and Applications*. ASHRAE Short Course, January, 2001. May be available from ASHRAE, 1791 Tullie Circle, Atlanta, GA 30329.

Excellent overview, with sections on loads and calculations; fundamentals, design, and applications; installation design and maintenance; problems; and checklists. May be assumed to cover the major points in the EPRI handbook, for which Shedd was the principal author.

Tennessee Valley Authority, (undated). *Heat Pump Water Heater Reference Manual*. (made available by TVA staff). Four sections: "General" introduction; a Lotus-based computer simulation program; equipment notes, and Applications and Examples.

TVA's program was relatively dormant for several years, so some of this material is not current. Includes:

- *Sizing method logical development paper, for spot cooling/water heating applications*
- *Brief description of triple function heat pump with exterior supplemental evaporator.*
- *Extensive case study material on Super Wash House coin-operated laundry, Knoxville, TN.*
- *Short blurbs on installations at full service restaurant (600 meals/day, chain); solar/hp hybrid nursing home (35 gal/patient-day) and motel; lots of other examples outlined.*
- *Equipment lists. Many of the devices described are not currently available.*

Weingarten, L, and Weingarten, S., 1998. *The History of Domestic Water Heating*. PM Engineer, October, p. 72 – 77.

A nice essay giving some historical context.

Some miscellaneous web sites, exclusive of those housing documents cited above:

<http://www.greentie.org/class/ixf12.htm>

very generalized four-paragraph introduction, not very helpful

http://hes.lbl.gov/hes/makingithappen/no_regrets/waterheaterheatpump.html

Nice 1-page description and suggestions, with a graphic.

<http://www.fpc.com/learning/tips/pumps.html>

Rather tepid endorsement for residential units.

<http://www.energydepot.com/wpsc/library/htpumpwh.asp>

Another utility site, pretty objective

<http://www.pnl.gov/techguide/21.htm>

Good introduction, with links to other sites.

http://www6.ladwp.com/energyadvisor/EA_26.html

Excellent treatment, from E-Source.

<http://www.ftc.gov/bcp/online/edcams/appliances/tables/waterheater.htm>

Federal Trade Commission site, showing how few models were on the market.

Manufacturer Web Sites for commercial-scale equipment:

<http://www.crispaire-e-tech.com/PUMP.htm>

<http://www.colmaccoil.com/coil/hpwh.htm>