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Summary of Qualifications

30 years of experience in management and technical roles associated with the research, development and deployment of energy efficiency and renewable energy technologies for buildings

Work History and Accomplishments

- 1989–present** **Oak Ridge National Laboratory, Oak Ridge, Tennessee**
Engineering Science and Technology Division, Commercial Buildings Group
- Serving currently as Group Manager of the ESTD Commercial Buildings Group
 - Serving currently as program leader for the Federal Energy Management Program (FEMP).
 - Served as direct staff support to the program manager for Building Equipment Research (BER), as well as a technical staffer in two programs (Thermally Activated Heat Pumps, Technology Implementation) within BER.
 - Received a Martin Marietta Energy Systems Significant Event Award for his role in licensing the DOE/Phillips “GAX” gas heat pump technology to Carrier Corporation.
 - Developed a major new Work for Others program (SERDP Geothermal Heat Pump Deployment for the Army Corps) that led directly to a role for ORNL in support of OPT’s GHP program.
 - Received the International Ground Source Heat Pump Association’s “Outstanding Engineering Achievement Award.”
 - Formed a public/private partnership between DOE and the National Association of Energy Service Companies (NAESCO) under the DOE Technology Introduction Partnerships (TIPS) umbrella called the Energy Fitness Program. Later this same program became known as Rebuild America Financial Services.
- 1988-1989** **P.J. Hughes & Associates, East Syracuse, New York**
Independent Consultant
- Provided technical and business services to industry, utilities, and government.
 - Wrote a Commercial Application Design Manual for a leading manufacturer of water-source heat pumps. The manual introduces the product line, the applications, and the design procedures for each application. The client was (and is) the industry leader in residential ground-source heat pump technology, and the manual was a key element in their plan to move the technology into commercial applications.
- 1982–1987**
1986-1987 **W.S. Fleming & Associates, Inc., East Syracuse, New York**
Vice President of Corporate Development
- Developed and initiated the implementation of a Five-Year Strategic Business Plan to guide the transition of the company from a reactive project-oriented firm to a proactive professionally managed firm with its own program of specialized services.
 - Defined successfully the core businesses of the company, the markets for the companies’ services, and the specialized services offered. Participated in developing the markets and the sales/delivery organization.
- 1984–1986** **Vice President of Syracuse Operations**
- Managed the development of staff and facility resources for multi-site field-testing of advanced energy utilization technologies. This specialized service became the company’s primary proactively marketable service.

- 1982-1984 **Senior Research Engineer**
- Initiated and managed a series of projects to refine residential ground-source heat pump products and develop the application technology via field-tests. Continued to manage the series of projects until their conclusion in 1987, when the program received a U.S. Department of Energy Award for Energy Innovation.
- 1978-1981 **Science Applications International Corporation, McLean, Virginia**
Senior Research Engineer/Deputy Division Manager
- Participated in the formation of a new division to offer consulting services in the area of energy conservation in buildings.
 - Established a generalized analytical methodology for evaluating the energy conserving potential and market potential of developmental building technologies. The division's activity centered around exercising this methodology to evaluate client technology development programs. Duties included project management, staff supervision, technical work and marketing of consulting services.
- 1975-1978 **University of Wisconsin-Solar Energy Laboratory, Madison, Wisconsin**
Research Engineer
- Participated in the development of software that became the international standard among university and industry researchers for the performance evaluation of advanced solar heating and cooling technologies applied to buildings. This software is now widely used for the evaluation of advanced energy utilization technologies of all types. Responsibilities included algorithm development, programming, documentation, and user training and support.
- 1972-1974 **Temperature Systems Inc., Madison, Wisconsin**
Assistant HVAC Design Engineer
- Designed heating, ventilating, and air conditioning systems for residential and small commercial buildings. Duties included load calculations, equipment specification, drafting, and job costing.

Education and Training

M.S., Engineering Management, 1982, Stanford University
M.S., Mechanical Engineering, 1975, University of Wisconsin
B.S., Mechanical Engineering, 1974, University of Wisconsin

Representative Publications

Hughes, P. J., and Pratsch, L. "Technical and Market Results of Major U.S. Geothermal Heat Pump Programs." To be presented at IEA Heat Pump Conference, Beijing, China, May 2002.
Fischer, S. K., Carlson, S. W., Hughes, P. J., and Henderson, H. I., "CHP Demonstration Projects at Federal Facilities," *ASHRAE Trans.*, 2002.
Shonder, J. A., Hughes, P. J., and Thornton, J. W., "Development of Deemed Energy and Demand Savings for Residential Ground Source Heat Pump Retrofits in the State of Texas," *ASHRAE Trans.*, 2002.
Shonder, J. A., Thornton, J. W., and Hughes, P. J., "Selecting the Design Entering Water Temperature for Vertical Geothermal Heat Pumps in Cooling-Dominated Applications," *ASHRAE Trans.*, 2001.
Hughes, P. J., and Strajnic, T. "Energy Savings Performance Contracting: Experience of the U.S. Department of Energy Federal Energy Management Program," *Proc. ACEEE Summer Study*, August 2000.

Certification of Accuracy

This resumé has been certified for accuracy by Patrick J. Hughes on February 21, 2002, and by Jeffrey E. Christian, Center Director, ORNL Buildings Technology Center, on February 21, 2002.