

PD-ABI-665  
USA 88517

**RCG/HAGLER, BAILLY - TEAM CONSULTING ENGINEERS  
DEMAND-SIDE MANAGEMENT TRAINING**

**First Phase**

**Bangkok, Thailand  
October 26 to 29, 1993**

Prepared for:

**The United States - Asia Environmental Partnership  
through a Cooperative Agreement with the World Environment Center**



**The World Environment Center**  
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### Disclaimer

This project is supported by the United States - Asia Environmental Partnership and the World Environment Center. The opinions expressed herein are the professional opinions of the authors and do not represent the official position of the Government of the United States of America or the World Environment Center.

## Executive Summary

Although Thai utilities have been pursuing demand-side management (DSM) policies, DSM has yet to achieve widespread implementation in Thailand. RCG/Hagler Bailly, Inc. (Hagler Bailly) believes that building local private sector DSM capacity through a joint venture business partnership with a Thai firm is the most effective approach for technology transfer in this area. With input from USAID/Thailand, Hagler Bailly identified TEAM Consulting Engineers Company Limited (TEAM) as a partner in Thailand. However, it is crucial that TEAM's DSM consulting capabilities be established so that the two firms can effectively pursue business opportunities together. With the assistance of the World Environment Center's Environmental Business Exchange Program under the United States-Asia Environmental Partnership (US-AEP) and with support from USAID/Thailand, Hagler Bailly developed a training program and provided its employees as volunteer specialists to train TEAM staff in Thailand.

In the first phase of project activities three volunteer specialists from Hagler Bailly provided training for five employees from TEAM in Thailand and identified appropriate staff from TEAM for further training in the United States. The training was held at TEAM's headquarters in Bangkok between October 26 and 29, 1993 from 9:00 a.m. to 6:00 p.m. each day. The training went smoothly, and the volunteers found that all five trainees from TEAM are very keen on learning these new concepts. All volunteer specialists agreed that further training for three of the most promising trainees will be useful. TEAM management was also very enthusiastic about the training and about developing a partnership with Hagler Bailly to explore new business opportunities in Thailand and conceivably in the region.

## II. Background

Thailand's electricity demand has been increasing at the unprecedented rate of over 10 percent per year in the past decade. To cope with this rising demand, the Government of Thailand (GOT) and the Electricity Generating Authority of Thailand (EGAT) have launched a comprehensive five-year, US \$189 million demand-side management program to promote energy efficiency and conservation. Although Thai utilities, including EGAT, the Provincial Electricity Authority (PEA), and the Metropolitan Electricity Authority (MEA), are considered to be among the most successful developing country utilities, their experience has been concentrated on the supply side of electric services.

In the past, the institutional capacity of Thai electric utilities has been developed to operate and maintain existing assets and to expand investment programs. The capacity to design, implement, monitor and evaluate the impacts of end-use efficiency must now be developed. During the past few years, Thai utilities (EGAT in particular) have been preparing their staff to work in the area of Integrated Resource Planning (IRP) and DSM. However, given the complexity of this task, they will need to import technologies and expertise from other countries, such as the United States, where there is much experience in the field.

Hagler Bailly has been pursuing business in the area of IRP/DSM with EGAT and other utilities in the region and plans to establish an office in Southeast Asia. However, the company's executives are convinced that the firm's presence in the region would be more effective in transferring technology and pursuing business development with a local partner. As a result, with assistance from USAID/Thailand, Hagler Bailly identified a local firm named TEAM Consulting Engineers Co., Ltd. (TEAM) as a potential candidate for a joint venture or partnership. Since then, Hagler Bailly executives have travelled to Thailand twice and have held several meetings with executives from TEAM to discuss and establish a teaming arrangement between the two firms. TEAM staff are also preparing to visit Hagler Bailly within the next two to three months.

The most recent visit took place on November 8, 1993, one week after the training ended. In this visit, Mr. Henri-Claude Bailly, Chairman of the Board of Hagler Bailly, travelled to Thailand to meet with Dr. Prasert Patramai, Chairman of the Board and Mr. Peerawat Premchun, Executive Director of TEAM to review the status of collaboration between the two firms and to follow up with the second and third phases of the training activities. On November 9, Mr. Bailly met with Eugene Morris, Jr., Deputy Mission Director and R.J. Gurley, Business Advisor, USAID/Thailand, where they reviewed the progress made on the collaboration between Hagler Bailly and TEAM and the training undertaken to date, and discussed DSM business opportunities in Thailand.

Hagler Bailly requested that USAID/Thailand support the training of a local firm in order to build local capacity to the level that both firms could benefit from collaboration. The World Environment Center recognized the need to develop local capacity and agreed to sponsor this Environmental Business Exchange between Hagler Bailly and TEAM.

The scope of work for the project has three main tasks (phases):

1. Three experts from Hagler Bailly will travel to Bangkok to present a one-week training course for TEAM staff on key areas of DSM, and to identify potential candidates from TEAM to attend further training in the United States.
2. Four persons from TEAM will travel to the United States and spend four weeks at Hagler Bailly offices, primarily in Arlington, VA, Boulder, CO, and Philadelphia, PA, working together with Hagler Bailly staff to gain first-hand experience on actual DSM consulting projects. Work will focus on hands-on training on DSM models and monitoring equipment, detailed studies of energy-efficient technologies, exposure to project work, and studies on advanced concepts such as load research and integrated resource planning. This trip will include visits to local electric utilities and exercises related to DSM modelling and program evaluation. In addition, TEAM members will attend a three-day DSM conference in San Diego at the end of their stay to learn about DSM experiences from around the United States.
3. Two experts from Hagler Bailly will travel to Bangkok to work with TEAM staff for one week. This training will be a follow-up to the hands-on training received in the United States, and will focus on initial in-country examples using available Thai data. This will provide local experience with the situation in Thailand, and begin to identify data availability and further needs.

### *Objectives*

The overall objectives of the activities are to establish and improve the capability of a local consulting firm in the area of DSM to the level that the business cooperation between the U.S. and Thai firm become most effective. Specifically, the project is aimed at facilitating and enhancing business cooperation between the two firms in the field of IRP/DSM in Thailand through a joint venture or teaming arrangement. Although the project is limited to only one Thai and one U.S. firm, it provides a much needed capability in the Thai private sector to help implement sustainable solutions to Thailand's critical energy problems. The strong comparative advantage of the U.S. firm in the area of IRP/DSM technology and expertise, combined with the Thai firm's knowledge of the local economy and market, would not only accelerate technology transfer and expertise but also help these businesses

secure consulting activities in the area of IRP/DSM in both Thailand and the region.

The Phase 1 mission consisted of three volunteer specialists, Dr. Voravate Tig Tuntivate (of Hagler Bailly's Arlington office), Mr. Frank Stern (Boulder), and Ms. Jeanne Clinton (San Francisco). The main objective of the mission was to:

- ▶ provide training on the general concepts covering all aspects of demand-side management (DSM program planning, design, implementation, and evaluation) to TEAM's staff
- ▶ identify three to four candidates from TEAM for further training in the United States
- ▶ assess the capability of trainees and TEAM in general for successful business cooperation.

### III. Curriculum - First Phase

The central purpose of the training was to provide TEAM's staff with the basic principles and applications of DSM as well as an introduction to several other key topics, such as end-use efficiency technologies, DSM program design, economic analysis of DSM programs, market research, market segmentation, as well as DSM program implementation, monitoring, and evaluation techniques. Trainees participated in a one-week intensive course on basic principles and applications, as well as research methods applicable to the area of IRP/DSM.

The initial plan was to provide in-depth training on DSM concepts and practices, and research methods for DSM. However, after assessing the trainees' backgrounds in statistics, the volunteer specialists decided to avoid detailed statistical modelling and analysis and instead lay a foundation for further training in the United States.

#### *Training Materials*

The materials used in the course provided an overview of DSM planning, program design, implementation/delivery, and evaluation. The training also covered how to perform cost-benefit analysis for program screening, survey research, engineering, statistics, and combined statistical and engineering methods to document kW and kWh savings from DSM programs. (Annex A)

#### IV. Findings

The five trainees had diverse educational backgrounds and work experiences, ranging across engineering, economics, business administration, and management information systems, and with one year to over 25 years of work experience. Name, education and years of work experience of trainees are as follow:

Mr. Praderm Chaiyasingh	BS, electric engineering, 28 years work experience
Mr. Porramate Vitisvorakarn	MA, economics, 10 years work experience
Ms. Suree Yantapanit	MBA, management information systems, 8 years work experience
Mr. Thanes Rattanasukhon	BS, mechanical engineering, 3 years work experience
Mr. Chatchai Khunboa	BS, electrical engineering, 1 year work experience

All of the trainees were very enthusiastic about learning new topics and discussing new ideas. The two most junior trainees, Mr. Thanes and Mr. Chatchai, have limited command of English, which inhibited their participation in the classroom. However, when an opportunity permitted them to express ideas in Thai to one of the volunteers, both trainees showed their knowledge in their field of expertise and were very eager to learn.

The three most senior trainees are excellent candidates for further training in DSM. Their past experiences seem to enhance and complement their learning process. Mr. Porramate and Ms. Suree have some experience in financial analysis and cost-benefit analysis and research, and can understand the financial analysis and research aspects of DSM very well. However, Mr. Praderm has much more work experience and can synthesize and apply DSM concepts to Thai conditions much more quickly. His participation in the class discussion and attempts to clarify some of the issues to his classmates in Thai clearly demonstrated that he understood the topic very well.

During the training, TEAM management had requested the mission staff to present an overview of DSM and of business opportunities for DSM, energy management, and energy efficiency consulting services to their senior officers. A meeting was held for this purpose on October 29, 1993, from 2:00 to 5:30 p.m. Approximately ten senior-level staff (almost all of TEAM's officers) attended this meeting. The meeting also provided a good opportunity to discuss the market potential for DSM and energy conservation in Thailand with senior officers from TEAM. This is very important because after a few days at TEAM, all volunteer specialists were convinced that the management and senior officers of TEAM are very committed and excited about the partnership with Hagler Bailly and business opportunities in Thailand. (Annex B)



## *Observations*

1. TEAM management is very enthusiastic about the prospect of joining with Hagler Bailly in exploring energy efficiency opportunities in Thailand.
2. TEAM management recognizes that the market for DSM consulting services will grow not only in Thailand but also elsewhere in Asia, and that DSM consulting services will open the door for other energy consulting services such as energy service businesses.
3. TEAM has an excellent reputation and is regarded by government and utility officials in Thailand as a first-class consulting and engineering firm.

## V. Conclusions

The mission staff believe that if all three senior trainees -- Mr. Porramate, Ms. Suree, and Mr. Praderm -- receive further training in DSM, they would be excellent consultants to EGAT. They will also serve as key research staff for future joint projects. TEAM management are also very enthusiastic about joining with Hagler Bailly to pursue energy efficiency/conservation business opportunities in Thailand. Based on their excellent reputation and commitment, we believe that TEAM and Hagler Bailly will form an excellent partnership.

## VI. Implementation Plan and Schedule

As the next phase of the project, TEAM management will send its staff for further training at Hagler Bailly. The appropriate date and time for this training will be determined jointly by both companies. The management of both firms will ensure that trainees arrive in the United States when Hagler Bailly is working on projects that will allow these trainees to gain hands-on experience and receive close supervision by experienced staff.

VII. Annexes

ANNEX A

**RCG/HAGLER BAILLY  
DSM Training Course  
October 26 through 29, 1993**

Day 1:

Introduction to course (1/2 hour)

1. Overview of DSM (2 hours)
2. Energy end-use, efficiency technologies, and methods (4 hours)

Day 2:

3. Economic analysis of DSM for utility (and national) and resource planning (4 hours)
4. Market and social research, analysis, and statistical methods (1½ hours)
5. DSM program design, marketing, and implementation management -- basic overview (2 hours)

Day 3:

6. Evaluating DSM programs
  - 6.1 Introduction -- purpose, value of program evaluation, fundamentals of evaluation research design (1½ hours)
  - 6.2 Impact evaluation (total 10 hours)

Day 4:

- 6.2 Impact evaluation (continued)

Day 5:

- 6.3 Process evaluation (4 hours)
- 6.4 Evaluation planning (1 hour)
7. Business issues for evaluation consultants and contractors (1 hour)

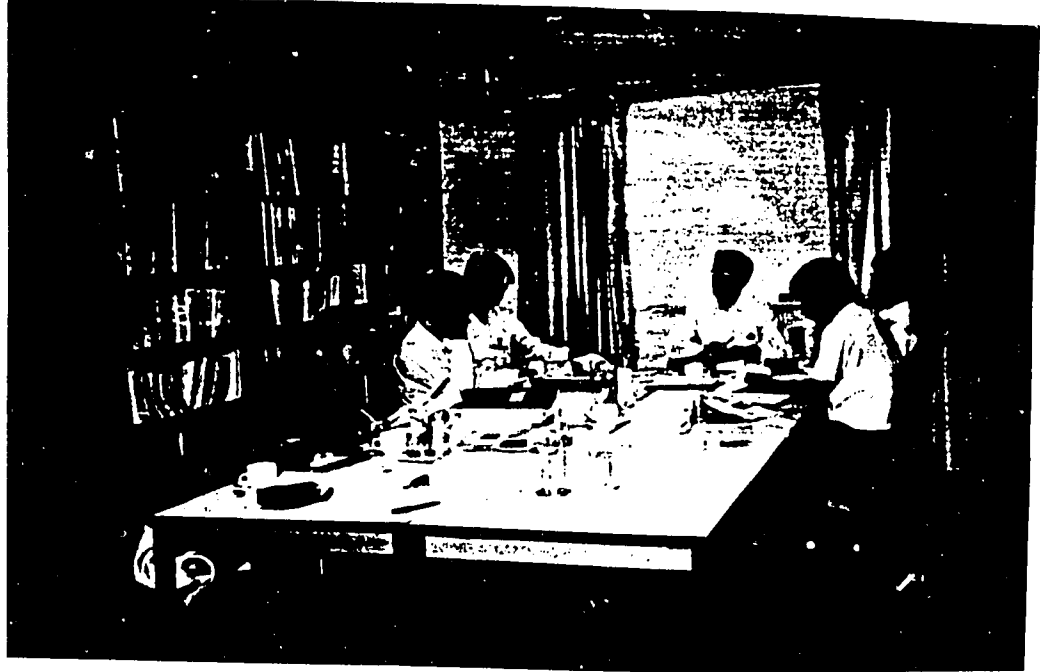
## ANNEX B

### RCG/HAGLER, BAILLY Inc. Topics of Presentation and Discussion with TEAM Management October 29, 1993

1. Review of current plans for Thailand energy efficiency
  - Electric Generating Authority of Thailand (EGAT)
  - Department of Energy Development and Promotion (DEDP)
  - Resident utility advisors from North America and Australia
  - Anticipated consulting needs
  - Estimated consulting contracts (based on project document and Energy Conservation and Promotion Act)
    - Direct by EGAT: \$10-20 million
    - Indirect at customer premises: \$120 million (EGAT)
    - \$30 million (DEDP)
2. Overview of DSM
  - Definition and example
  - How to accomplish
  - Factors motivating
  - Trends
  - Technologies and costs
  - DSM phases: planning, design, implementation and evaluation
3. Introduction to DSM evaluation
4. Business venture prospects and issues
  - Six potential business areas
  - Contractual and staffing issues
  - TEAM staff looking at DSM business opportunities
    - ▶ Evaluation
    - ▶ Market assessment and research
    - ▶ Technical (commercial and industrial) implementation support to EGAT, MEA, PEA, and DEDP
    - ▶ Technical assistance to "controlled facility"\*
    - ▶ Energy service company
    - ▶ DSM program development and design support to EGAT (currently, EGAT has been developing and designing its own DSM program)

A "controlled facility" is the facility defined by Energy Conservation and Promotion Act as a facility with a demand exceeding one MW per month.

ANNEX C  
**PHOTOGRAPHS**

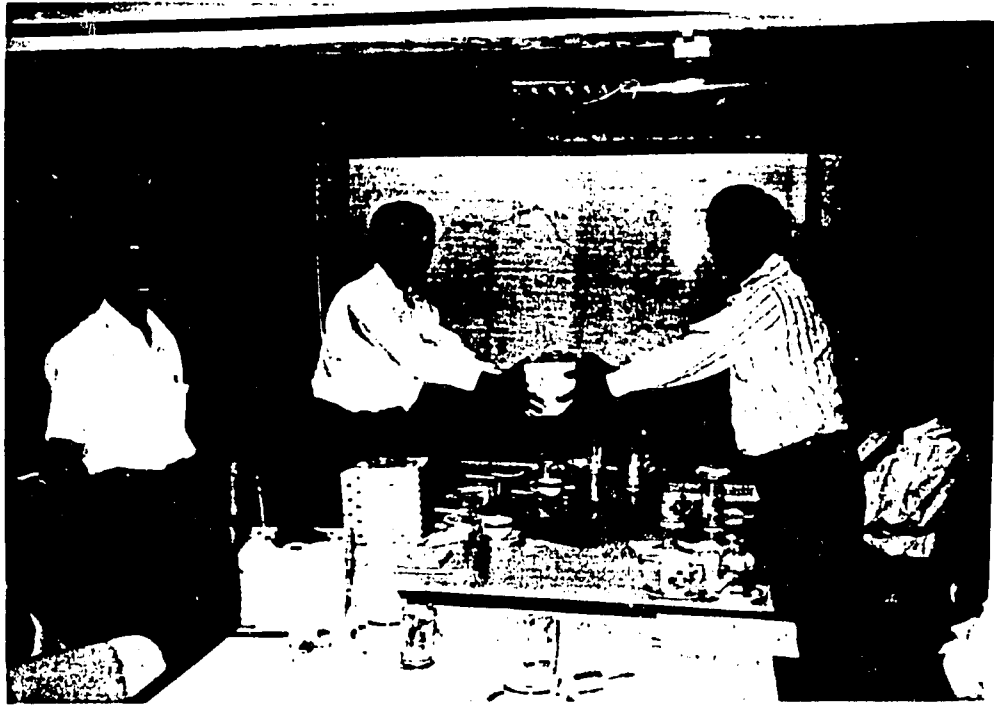


Frank Stern provides an overview of the DSM field to the TEAM Engineers.

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(left, front to back) Ms. Suree Yantapanit, Frank Stern, Voravate Tuntivate, Thanes Rattanasukhon discuss DSM issues over lunch with (right back to front) Chatchai Khunboa, Praderm Chaiyasingh, Jeanne Clinton, and Porramate Vitisvorakarn.



Prasert Patramai, Chairman of the Board, TEAM presents gift to Frank Stern while Voravate Tuntivate, RCG/HB and Peerawat Premchun, Executive Director, TEAM look on.



Jeanne Clinton, RCG/HB makes a point during the training session.

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ANNEX D  
CURRICULUM VITAE

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## **VORAVATE TIG TUNTIVATE**

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### **PRESENT POSITION**

Senior Associate, RCG/Hagler, Bailly, Inc., Arlington, VA, 1992-.

### **AREAS OF QUALIFICATION**

- ▶ Energy policy analysis
- ▶ Demand-side management program planning and evaluation
- ▶ Household energy demand assessment
- ▶ Quantitative methods
- ▶ Market research and survey research methods

### **PREVIOUS POSITIONS**

- ▶ Consultant, World Bank, Washington, DC, 1990-1992
- ▶ Research Associate, Delaware Administration Institute, Newark, Delaware, 1988-1990
- ▶ Statistical Consultant, Social Science Data Center, University of Pennsylvania, Philadelphia, Pennsylvania, 1985-1988
- ▶ Research Associate, Center for Energy and Urban Policy Research, University of Delaware, Newark, Delaware, 1982-1985
- ▶ Market Planner, Union Bank of Bangkok, Office of the President, Bangkok, Thailand, 1975-1978
- ▶ Summer Intern, National Energy Administration, Bangkok, Thailand, 1972

### **EDUCATION**

- ▶ University of Delaware, Newark, Phd, Public Policy, 1989
- ▶ State University of New York at Stony Brook, MA, Economics, 1982
- ▶ Thammasat University, Bangkok, Thailand, BA, Economics and Public Administration, 1977

### **PROFESSIONAL EXPERIENCE**

Dr. Tuntivate is an energy policy analyst and economist with a strong background in energy policy analysis, energy demand assessment, and DSM program planning and evaluation. He is also proficient in research design, survey research methods, evaluation research, experimental design, and quantitative methods (cost-benefit analysis, financial analysis, econometrics, and several bi-variate and multi-variate statistical techniques), and social science research.

**1992- 1993 Process and Impact Evaluations of Central Hudson's Curtailable Electric Service Program**

For: Central Hudson Gas & Electric

In this assignment Dr. Tuntivate was responsible for evaluating the effectiveness, operation and performance of the program. For the process evaluation, he explored program operations and identified ways to improve program delivery and increase participation. For the impact evaluation, he examined the effects of the program, and measured program participation and participant acceptance of the program. Both the process and impact evaluations utilized surveys of participants and interviews with program personnel. Impacts were assessed using statistical techniques.

**1992 Impact and Process Evaluations of the Apple Power Rebate Programs for C/I Customers**

For: Consolidated Edison Company of New York

Dr. Tuntivate participated in the impact evaluation of the five DSM programs that make up Apple Power (Lighting, Motors, Electric Air Conditioning, Steam Air Conditioning, and Gas Air Conditioning), as well as supporting the process evaluation of these programs. The impact evaluation used engineering algorithms and statistical methods (where the participation base was sufficient) including Statistically Adjusted Engineering (SAE) estimates. Both methodologies were supported by data obtained through telephone surveys with participants and interviews with contractors, billing data, and data from the program tracking database.

**1992 Vietnam Energy Strategy/Rural Energy Project**

For: World Bank

On this World Bank project, Dr. Tuntivate had primary responsibility for supervising and managing three surveys and fieldwork, developing design sampling techniques, and developing the survey instrument to assess energy consumption of the households sector in the Red River Delta region. He also conducted a workshop and provided training to Vietnam Institute of Energy personnel in the areas of survey research methods, social science research, and the application of survey data in social science research and energy policy analysis.

**1990- 1992 Energy Sector Management Assistance Program (ESMAP)**

For: World Bank

For the World Bank's ESMAP project, Dr. Tuntivate had primary responsibility for an energy consumption survey, the development of survey instruments, the design of research projects, data analysis and report writing. He recently completed work on the Bank's *Lao PDR: Urban Energy Demand Assessment Study* report. In this project, Dr. Tuntivate had major responsibility for designing a research project to assess residential/commercial energy consumption, particularly electricity consumption, and appliance ownership. This work entailed the evaluation of woodfuel, kerosene, LPG, and electricity, as well as end-use appliance monitoring for the evaluation of demand-side management measures and a comprehensive energy consumption and appliance

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ownership survey. Dr. Tuntivate's work on this project also included developing questionnaires for data collection, providing training to the Lao PDR's utility personnel in the area of appliance monitoring techniques, survey research methods, database coding and analysis, negotiating with government officials regarding logistic support, supervising and managing the survey and fieldwork, and compiling and analyzing the data for the project report.

Dr. Tuntivate's other research responsibilities for the ESMAP program included specifying study scopes, preparing terms of reference, designing an energy efficiency database, evaluating World Bank energy efficiency activities in the energy and industrial sectors, and managing a research project on the organization of energy efficiency institutions in East and Southeast Asia, which were conducted by external consultants.

**1988- Research Design for Criminal Justice Studies**

1989 For: Delaware Public Administration Institute

As a research associate at the Delaware Public Administration Institute, Dr. Tuntivate provided assistance and consultation in the area of the research design and the application of quantitative methods for social science research for the Institute's projects. He also collected data, designed layouts for databases and coding, and conducted data analyses on two major criminal justice studies.

**1985- Social Science Research Methodologies**

1988 For: Social Science Data Center, University of Pennsylvania

As statistical and data consultant to the Social Science Data Center, University of Pennsylvania from 1985 to 1988, Dr. Tuntivate specialized in the application of statistical and social science research methodologies. In addition, he taught classes and conducted training on how to use social science, energy, health, and economic data for research and training purposes, as well as on the use of statistical and econometrics software.

**1982- Household Electricity Demand Analysis**

1985 For: Center for Energy and Urban Policy Research, University of Delaware

As a research associate at the Center for Energy and Urban Policy Research, University of Delaware, Dr. Tuntivate analyzed household electricity demand in the state, created a data base for emergency planning in Delaware, and managed the Delaware household survey. He also participated in a major research project to evaluate the impacts of the Billing Information and Conservation Programs for Delmarva Power and Lighting Company.

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**1975- Market Planning**

1978 For: Union Bank of Bangkok, Thailand

As a market planner for the Office of the President of Union Bank of Thailand, Dr. Tuntivate conducted marketing survey and feasibility analyses, and prepared the macro-economic assessment report for the Bank.

**1972 Household Fuels Consumption Survey**

For: National Energy Administration, Thailand

As an intern with the National Energy Administration in Thailand, Dr. Tuntivate collected survey data for household fuels consumption in Bangkok, and conducted a survey of rural household economic status.

**LANGUAGE CAPABILITIES**

Dr. Tuntivate is bilingual in Thai and English.

**PRESENT POSITION**

Principal Consultant to RCG/Hagler, Bailly, Inc., San Francisco, CA, 1993-.

**AREAS OF QUALIFICATION**

- ▶ Demand-side management, planning, program design, and evaluation
- ▶ Integration of DSM in resource plans
- ▶ Energy/environment analysis applications
- ▶ Collaborative planning processes
- ▶ Market and organizational analyses
- ▶ Project management
- ▶ Focus groups and utility customer market research
- ▶ Training and expert witness testimony
- ▶ Strategic energy technology business planning.

**PREVIOUS POSITIONS**

- ▶ Principal, Barakat & Chamberlin, Inc., 1985-1993
- ▶ Independent Consultant, 1984-1985
- ▶ Research Fellow, American Council for an Energy Efficient Economy, 1984-1985
- ▶ Manager, Conservation and Solar Programs, City of Palo Alto Utilities Department, 1980-1984
- ▶ Energy Conservation Specialist and Program Manager, California Energy Commission, 1976-1980
- ▶ Program Management Analyst, Housing and Development Administration, City of New York, 1973-1975

**EDUCATION**

- ▶ University of California, Berkeley, MCP, City and Regional Planning, 1977
- ▶ Dartmouth College, BA, Urban Studies, 1973

**PROFESSIONAL EXPERIENCE**

Ms. Clinton has over 17 years of experience in demand-side management, market analysis, and energy/environmental applications for energy and water utilities and government agencies. She has worked with many of the nation's leading electric utilities to develop comprehensive technical analyses and manage sensitive regulatory relations.

Ms. Clinton has directed and performed analyses of demand side management technical and market potential, designed and implemented DSM programs for all sectors, conducted program evaluations addressing load impacts, participation and implementation processes.

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analyzed the contribution of DSM in integrated resource planning processes, and presented expert testimony before state regulatory commissions. Ms. Clinton is an active participant and invited speaker on the subject of energy management planning to many organizations, and she teaches seminars on DSM program design, implementation, and integrating DSM into resource planning.

In the United States she has successfully managed collaborative planning activities in New York and North Carolina. Through her work with the U.S. Environmental Protection Agency and others, she is increasingly involved in the development of utility policies and programs designed to reduce greenhouse gases and mitigate other environmental impacts. For California's largest wholesale water utility, she developed an organization and implementation plan for water resource best management practices affecting over ten million people. She has also applied her expertise in market assessment and planning to clients in telecommunications, solid waste and gas industries.

In Russia, Ms. Clinton is currently managing an effort under a support contract for US AID and US EPA to introduce integrated resource planning (IRP) in Russia through a collaborative project of American and Russian government, utility, university, and environmental organizations. Activities include identifying an implementation strategy; organizing the project's technical, management and communications functions; coordinating use of technical experts; and planning meetings.

In Thailand, Ms. Clinton recently completed an assignment in which she and other Hagler Bailly staff taught a week-long Introduction to DSM course for a Thai consulting engineering firm and assessed opportunities for private sector consulting and support services in Thailand. This was part of a USAID/Asian Environmental Partnership strategy to build local Thai private sector capability to support DSM implementation by the Electric Generation Authority of Thailand.

For India, Ms. Clinton is working for the USAID's India Private Power Initiative project, in the Office of Energy and Infrastructure, to develop a project to provide technical assistance to Government of India at center and state levels to incorporate IRP into electric power sector planning. This work will include identification of recommended changes to legislation, regulation, and planning practices.

As Palo Alto, California's Manager of Conservation and Solar Programs, Ms. Clinton directed extensive energy management, solar design and financing services to residential, commercial and industrial customers. Reporting to the Utilities Director and City Council, she was responsible for program development, analysis, implementation, and evaluation. She also developed strategic plans for managing commercial/industrial electric loads and won several national awards for innovation.

Prior to her position with Palo Alto, Ms. Clinton was a conservation program manager for the California Energy Commission, where she led survey, analysis, and program development projects for major state conservation initiatives in the areas of commercial buildings, RCS, electricity shortage planning, and energy/water delivery and management policies. She also has worked as a program management analyst for a community-

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managed abandoned housing program for the Housing and Development Administration of the city of New York.

Ms. Clinton was the recipient of a research fellowship with the American Council for an Energy Efficient Economy at which time she co-authored the book, *Energy Efficiency in Buildings: Progress and Promise* that outlined a national research and implementation strategy. She has also co-authored *Moving Toward Integrated Resource Planning* for EPRI and *Energy Services Planning* for the APPA.

## **PUBLICATIONS**

*Policymakers Guide to Energy Services.* American Public Power Association. 1989.

*Energy Efficiency in Buildings: Progress and Promise.* American Council for an Energy Efficient Economy (ACEEE). 1986.

*Moving Toward Integrated Resource Planning: Understanding the Theory and Practice of Least-Cost Planning and Demand-Side Management.* Electric Power Research Institute (EPRI). 1986.

"Review of Government and Utility Energy Conservation Programs." Annual Review of Energy. 1986

*Energy Conservation in California Multifamily Rental Housing.* California Energy Commission. June 1985.

*Energy Services Planning.* American Public Power Association, co-author of "Implementation" chapter. 1982.

*Nonresidential Energy Efficiency in California: Achieving a 20 Percent Improvement by 1985.* California Energy Commission. 1980.

## **SELECTED TECHNICAL REPORTS AND PRESENTATIONS**

"Data and Analysis Methods Available to Conduct Environmental and Energy Assessments of Tree-Related Utility Programs," NARUC Integrated Resource Planning Conference, with J. Hashem, Santa Fe, NM, April 1991.

"Developing Opportunities for DSM," presentation for panel "Conservation Approach to Energy Independence," Federal Energy Bar Association meeting, Washington, DC, November 1990.

"DSM — Getting Serious, Being Real, Staying Sane," Iowa State University Regulatory Conference, Iowa Utilities Association, Ames, IA, May 1990.

"Bringing DSM into the Mainstream: How to Build Marketing and Delivery Systems that Work — Some Maxims and Examples," presented at the ECNE National Conference on Utility DSM Programs, Boston, MA, November 1989.

"High-Efficiency Fluorescent Lighting Program: An Experiment with Marketing Techniques to Reach Commercial and Small Industrial Customers," Argonne National Laboratory, Fourth International Energy Program Evaluation Conference, with A. Goett, Chicago, IL, August 1989.

"Challenges in Evaluating Third-Party Demand-Side Management Resources," Executive Enterprises conference on Electricity Purchasing Strategies, San Francisco, CA, May 1989.

"Designing/Using a DSM Database in Utility Planning," Workshop presented at the 1988 ACEEE Summer Study on Energy Efficiency in Buildings, with C. Sabo, D. Norland, and J. Gallagher, Pacific Grove, CA, August 1988.

"New Dimensions in Utility-Customer Interface: What Does It Mean for Research?" Lawrence Berkeley Laboratory, Berkeley, CA, February 1988.

"Evaluation of the City of Palo Alto Utilities PARTNERS Program (C/I Rebate Program)," Argonne, National Laboratory, Third International Energy Program Evaluation Conference, with M. Dimit, Chicago, IL, August 1987.

"Critical Issues Facing U.S. Electric Utilities," International Energy Agency, Paris, France, June 1987.

"Overview of the California Electric Utility Industry," Pacific Bell account executives briefing, Monterey, CA, April 1987.

"Demand-Side Management: The Science of Technology and Behavior," Massachusetts Executive Office of Energy Resources DSM conference, Boston, MA, January 1987.

"Achieving Commercial/Industrial Energy Efficiency in a Market Environment," 1986 ACEEE Summer Study on Energy Efficiency in Buildings, Pacific Grove, CA, August 1986.

"Roles for Local Governments and Community Groups in Delivering Energy Services," panel co-leader for week-long ACEEE conference, 1984.

"Measuring and Evaluating the Residential Conservation Programs of the Palo Alto (CA) Utilities Department," presented at the 1982 ACEEE Summer Study.

Speaker at American Public Power Association conferences (1983-1987) on:

- ▶ "Integrated Resource Planning"
- ▶ "Selling Conservation to Utility Management and Boards"
- ▶ "Microcomputer Tools for Evaluating Program Cost Effectiveness"
- ▶ "Planning and Designing Demand-Side Programs"



**COURSES AND LECTURES**

"Demand-Side Management: Principles and Applications," speaker at week-long training course sponsored by Demand-Side Management Training Institute, Dallas, TX, September 1992.

"Demand-Side Management Program Design and Evaluation Workshop," instructor at three-day course organized for Hawaii Department of Business and Economic Development, with participation from investor and municipal utilities, county government staff, and environmental organizations, Honolulu, HI, May 1992.

"National Experience with Residential Energy Programs," presentation of half-day workshop to advise Dayton Power & Light staff and local community members of collaborative planning group on energy program options, Dayton, OH, May 1992.

"Demand-Side Management: Strategies and Methods," two-day course sponsored by The Management Exchange/Public Utilities Reports, co-instructor for courses held in San Francisco, CA, New Orleans, LA, and Washington, DC, five times between June 1991 and July 1992.

"Demand-Side Management: Theory and Practice," seminar sponsored by and taught by members of the staff of Barakat & Chamberlin, Oakland, CA, February 1991.

"Making Conservation Profitable: Issues for Regulation and Evaluation," Plenary Session with R. Cavanagh and M. Munts, presented at The Fourth International Conference on Evaluation in Chicago, August 1989.

"Integrated Resource and DSM Planning," three day course co-taught with J. Chamberlin for the American Public Power Association on five occasions, 1987-1988.

"Load Forecasting and Management for a Changing Industry," seminar co-instructor with John Chamberlin, American Public Power Association, Seattle, March 1986.

"Planning for Commercial/Industrial Energy Management Services," in-house training seminar for the Modesto Irrigation District, Modesto, CA, January 1986.

"Evaluating Conservation Programs," American Public Power Association, instructor for a one-day seminar on program evaluation, 1982.

**PROFESSIONAL ACTIVITIES AND ORGANIZATIONS**

- ▶ Member, Association of Demand Side Management Professionals
- ▶ Member, Association of Professional Energy Mangers

## LIST OF CONTACTS

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### *TEAM CONSULTING ENGINEERS CO., LTD.*

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## **FRANKLIN D. STERN**

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### **PRESENT POSITION**

Senior Associate, RCG/Hagler, Bailly, Inc., Boulder, CO, 1989-.

### **AREAS OF QUALIFICATION**

- ▶ Demand-side management (DSM) impact evaluation
- ▶ Integrated resource planning
- ▶ Estimation of potential savings from DSM
- ▶ DSM program design
- ▶ Demand-side technologies
- ▶ Building energy analysis

### **PREVIOUS POSITIONS**

- ▶ Research Engineer, Colorado Office of Energy Conservation, Denver, CO, 1988-1989
- ▶ Engineer, Battelle/Pacific Northwest Laboratories, Richland, WA, 1987
- ▶ Research Assistant, University of Colorado, Boulder, CO, 1986-1987.

### **EDUCATION**

- ▶ University of Colorado, MS, Civil Engineering, 1987
- ▶ University of Colorado, BED, Environmental Design, 1982

### **RELEVANT WORK EXPERIENCE**

Mr. Stern specializes in demand-side management (DSM) and integrated resource planning for electric and gas utilities throughout the U.S. and internationally. His areas of expertise include residential and commercial building computer simulation modeling, benefit/cost analysis, and estimation of potential DSM program savings. Mr. Stern has participated in the preparation of expert witness testimony and in litigation support. Mr. Stern's most recent experience includes contributions to several EPRI guidebooks relating to DSM, a residential electricity consumption study in Pakistan, the development of plans for DSM program evaluation, evaluation of DSM programs for utilities in several states, assessment of DSM potential, and policy support to the U.S. EPA.

**1992 Estimation of the Remaining Potential for Industrial DSM**  
For: Pacific Gas & Electric (PG&E)

Mr. Stern is managing an effort to evaluate the remaining technical, economic, and achievable potential for DSM in the industrial sector in PG&E's service territory. The approach used combines a top-down analysis, using system-level consumption data for the sector, with a bottom-up analysis, which uses measure-specific information on DSM technologies.

**1992 Residential Electricity Consumption Study**  
For: World Bank

Mr. Stern is coordinating an analysis of residential load profiles in Pakistan using multivariate regression, as well as the modification and shipment of load profiles being used in the analysis. This project involves one- and seven-day monitoring periods in conjunction with an on-site survey.

**1992 DSM Measure Screening and Program Concept Identification**  
For: TransAlta Utilities Corporation

The cost-effectiveness from a total resource perspective of a large library of possible DSM measures was evaluated in this assignment. The technical, economic, and achievable potential was forecast to the year 2002. All four of the major Alberta utilities were involved in this study.

**1992 Engineering Estimation of Residential DSM Impacts**  
For: Florida Power & Light

Mr. Stern is coordinating an effort to develop engineering estimates of impacts by measure, customer segment and utility area, using, to the extent possible, characteristics of actual program participants. The results will be integrated with a statistical analysis and incorporated as part of a program tracking system.

**1992 Guidebook on DSM in the Water and Wastewater Treatment Industry**  
For: Electric Power Research Institute

Mr. Stern contributed case study summaries and DSM program planning, implementation, and evaluation perspectives to a guidebook oriented towards the applications of DSM in the water and wastewater treatment industry.

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**1992 Evaluation Planning**  
For: Burlington Electric

Mr. Stern is preparing a plan for impact and process evaluations of residential and commercial/industrial DSM programs. Distinct approaches are recommended for each major program type in this assignment.

**1992 Survey of Commercial/Industrial Customers**  
For: Bangor Hydro-Electric

In this engagement, Mr. Stern conducted on-site surveys of the larger commercial/industrial customers in Bangor Hydro-Electric's service territory to characterize energy use, determine existing saturation of energy conservation measures, and assess the potential for DSM penetration.

**1992 Survey of Gas DSM Activities**  
For: Peoples Gas

Mr. Stern surveyed gas utilities in North America to determine types of programs being offered, incentive structures, and penetration rates achieved.

**1992 Evaluation Planning**  
For: General Public Utilities

In this engagement, Mr. Stern prepared evaluation plans for several residential and commercial/industrial programs. Plans included statistical billing analysis, end-use metering, and engineering analysis.

**1991- Engineering Estimate of DSM Program Impacts**  
1992 For: Houston Light and Power

Mr. Stern coordinated an effort to estimate energy and load shape impacts from a residential new construction DSM program.

**1991 Review of DSM Programs**  
For: Bangor Hydro-Electric

Mr. Stern reviewed estimates of DSM potential and compared these to technical and achievable potential. He then made recommendations regarding potential additions to program inventory and the integration of the DSM forecast with the demand forecast.

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**1991 Integrated Resource Planning Framework Development**  
For: British Columbia Gas

Mr. Stern developed a screening model for evaluating gas DSM measures (including fuel switching). The model includes a gas valuation component based upon gas marginal costs.

**1991 Review of DSM Impact Evaluations**  
For: City of Austin

Mr. Stern reviewed engineering and statistical approaches to impact evaluation for several DSM programs, and made suggestions on methods of improving accuracy of forecasted impacts.

**1991 Scoping Study for Program Evaluation**  
For: Pacific Gas and Electric

Mr. Stern prepared an evaluation strategy for a residential new construction program.

**1991 DSM Measure Screening**  
For: Central Illinois Power

Mr. Stern calculated benefit-cost ratios from several perspectives for over one hundred DSM measures in the residential, commercial, and industrial sectors.

**1991 DSM Program Design**  
For: Northern States Power

In this assignment, Mr. Stern developed an award system based on potential avoided costs, and a prescriptive criteria based on ASHRAE Standard 90.1. He then compared Standard 90.1 to existing codes using the DOE-2 program.

**1991 Residential DSM Program Evaluation**  
For: Wisconsin Power and Light

Mr. Stern developed engineering estimates of savings from residential programs for integration with statistical billing analysis. This multi-measure, multi-program study used the DOE-2 simulation program.

**1990- Workshop Sessions on Evaluating DSM Programs**

1991 For: EPRI, Ontario Hydro, San Diego Gas and Electric

Mr. Stern prepared and presented workshop sessions on engineering methods of evaluating DSM programs.

**1990- Estimation of Effects of DSM on Greenhouse Gas Emissions**

1991 For: United States Environmental Protection Agency

In this assignment, Mr. Stern estimated the impacts of utility DSM programs in the residential, commercial and industrial sectors on greenhouse gas emissions. He modelled future scenarios using the REEPS and COMMEND models, and assisted in the development of a simplified regional dispatch model.

**1990 Preparation of Expert Testimony**

For: American Electric Power

Mr. Stern prepared expert testimony on the technical, economic, and achievable potential for energy conservation in American Electric Power's service territory.

**1990 Review of DSM Screening Process**

For: District of Columbia Public Service Commission

In this assignment, Mr. Stern evaluated the reasonableness of the approach taken and estimated the savings in a proposed least-cost plan.

**1990 DSM Program Design**

For: Wisconsin Electric Power Company

Mr. Stern performed an engineering analysis of demand-side management (DSM) programs for a major Midwest utility. In this assignment, he measured the impacts of each sub-program on electric rates and measured the benefits of the entire program.

**1990 Estimation of Potential Gas Savings from Northeast DSM**

For: Private client

In this assignment, Mr. Stern estimated potential savings from typical DSM programs in several Northeast states.

**1989 Engineering Estimate of DSM Program Savings**  
For: Seven New Jersey electric and gas utilities

In this assignment, Mr. Stern developed an engineering model of energy and demand savings in a statewide conservation program in New Jersey. The model included over 300 building simulations using the DOE-2 and ESPRE models.

**1989 Benefit/Cost Analysis of DSM Programs**  
For: Seven New Jersey electric and gas utilities

Mr. Stern developed a benefit/cost model of the New Jersey conservation assessment program. The model incorporates the California Standard practice methodology to assess over 70 DSM programs.

**1988 Commercial Buildings Energy Standards Application**  
For: State of Colorado

Mr. Stern advised the mechanical design contractor for the new Denver Airport on the application of ASHRAE Standard 90.1. The application involved whole building energy simulation using DOE-2.1d.

**1988 Evaluation of Energy Use Models**  
For: State of Colorado

In this assignment, Mr. Stern developed a procedure to evaluate the accuracy of simplified residential energy use models using the DOE-2.1c, BLAST, and SUNCODE hourly simulation programs to establish benchmarks.

**1988 Commercial Energy Code Software Development**  
For: State of Colorado

Mr. Stern developed a computer program and related manual to assist in compliance with building energy codes. He advised building officials and builders on the application of codes.

**1988 Assessment of Economic Development Impact of DSM**  
For: State of Colorado

Mr. Stern compiled data for incorporation in an input/output model of macroeconomic impacts of demand-side management projects on the state's economy. He also performed a beta test of the model.

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1988 **Building Audits**  
For: State of Colorado

Mr. Stern conducted building audits for the Institutional Loan Program.

1987 **Efficacy Testing of Proposed ASHRAE Standard 90.1**  
For: United States Department of Energy

Mr. Stern studied possible bias of ASHRAE Standard 90.1P. This project examined how the standard's regression model for the building envelope responded to different combinations of components in a broad range of climates using the DOE-2.1c computer program as a benchmark.

1987 **Expert System Development**  
For: State of Colorado

Mr. Stern developed a prototype expert system to diagnose energy use and recommend energy conservation measures.

1986- **Statistical Modelling of Daily Energy Consumption**  
1987 For: University of Colorado

In this assignment, Mr. Stern developed regression models of several buildings that predict normal energy consumption using various environmental and operational parameters as independent variables. He collected and analyzed daily energy consumption data from three building complexes. In addition, he assembled components of and calibrated the Fowlkes data acquisition system.

## SELECTED PUBLICATIONS

Etter, C. and F. Stern. "Estimating Marginal Gas Costs: A Case Study," to be presented at the 1992 ACEEE Summer Study on Energy-Efficiency in Buildings, Asilomar, CA.

Stern, F., M. Keneipp, and D. Reck. "An Awards Program for Energy-Efficient Commercial Building Design." New Construction Programs for DSM Conference, South Lake Tahoe, CA, May 1992.

Stern, F. "ENCODE, An Energy Code Compliance Tool," in *Software Applications and Directory for Energy Analysis*. Lilburn, GA: Fairmont Press, 1992.

Violette, D., F. Stern, and M. Ozog. *Integrated Planning, DSM evaluation and Cost Recovery Issues for Gas Distribution Utilities*. American Gas Association, 1991.

- Schillo, B., M. Shelby, B. Ciliano, C. Lang, and F. Stern. "DSM Impacts on Global Climate Change: DSM as Best Available Control Technology." Fifth National DSM Conference, Boston, MA, August 1991.
- Violette, D., F. Stern, and M. Ozog. *Impact Evaluation of DSM Programs: Volume 2, Case Studies and Applications*. Palo Alto, California: Electric Power Research Institute, July 1991.
- Violette, D., M. Ozog, M. Keneipp, and F. Stern. *Impact Evaluation of DSM Programs: Volume 1, A Guide to Current Practice*. Palo Alto, California: Electric Power Research Institute, February 1991.
- Violette, D., F. Stern, and V. Esposito. "Valuation of Gas for Use in Gas Utility Integrated Planning." Presented at NARUC's Third National Conference on Integrated Resource Planning, Sante Fe, NM, April 1991.
- Ciliano, B., F. Stern, C. Lang, M. Keneipp, and C. Neil. *DSM Impacts on Global Climate Change*. Prepared for Canadian Electrical Association, October 1990.
- Ciliano, B., M. Keneipp, and F. Stern. *Pre-Evaluation of a Multi-Sector DSM Rebate Program*. Prepared for Canadian Electrical Association, October 1990.
- Violette, D., M. Ozog, G. Wear, and F. Stern. *The New Jersey Conservation Analysis Project: Final Results and Assessment of Methods*. Prepared for Canadian Electrical Association, October 1990.
- Keneipp, M., R. Ciliano, F. Stern, and M. Osvatic. "Developing Demand-Side Programs for Commercial/Industrial New Construction Projects." ACEEE 1990 Summer Study.
- Kreider, J., K. Cooney, L. Graves, K. Meadows, F. Stern, and L. Weilert. "An Expert System for Commercial Building HVAC and Energy Audits-A Progress Report." *ASHRAE Transactions 1990*, V. 96, Pt. 1.
- Stern, F. "Energy Codes Computerized Compliance Tool." Presented at the Third National Conference on Microcomputer Applications in Energy, Tucson, Arizona, November 1988.
- Haberl, J., F. Stern, L. Smith, K. and Cooney. "An Expert System for Building Energy Consumption Analysis: Developing an Action-Oriented Team Approach." Presented at the American Society for Heating, Refrigerating and Air-Conditioning Engineers Conference, New York, NY, January 1988.
- Cooney, K., F. Stern, and J. Haberl. "An Action Oriented Team Approach to Building Energy Conservation Using Regression Techniques and Expert Systems." Presented at the American Society of Mechanical Engineers National Conference, December 1987.
- Stern, F. *An Efficacy Test of the ASHRAE Standard 90.1p Envelope Model*. Master's Report, University of Colorado, Boulder, December 1987.

**PROFESSIONAL AFFILIATIONS**

- ▶ Associate Member, American Society of Heating, Refrigerating, and Air-Conditioning Engineers
- ▶ Member, Association of Demand-Side Professionals.

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