

## **CV of Francis de Winter**

Francis de Winter and Associates

Contract R&D and Engineering Consultancy in the Thermal Sciences

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### **Educational Background**

Mechanical Engineer (1961), M.S. (1960), B.S. (1958), all in the Department of Mechanical Engineering of MIT, Cambridge, MA, USA

Secondary - Buenos Aires, Argentina

Primary - Amsterdam, the Netherlands, and Buenos Aires, Argentina

### **Languages**

Fluent in Dutch, Spanish, and English. Working knowledge of French.

### **Technical Experience**

Mr. de Winter has specialized in heat transfer and such associated fields as fluid flow and thermodynamics. He has worked on freeze-drying and on desalination, on the design of instruments for determining thermophysical properties of materials, on thermal control of space vehicles, and on spacecraft power system design, notably the JPL Venus-Mercury Flyby Mission (Mariner 10) and the JPL Voyager mission to the outer planets, and now to space beyond. The JPL spacecraft power work involved solar photovoltaic, solar thermionic, and radioisotope thermoelectric power system design. In terrestrial solar energy applications, Mr. de Winter has worked on swimming pool heating and domestic water heating, on flat plate collectors and on concentrating collectors, on heat exchangers in solar water heating systems, and on gas water heaters for solar backup service and for stand-alone service. The de Winter "Heat Exchanger Factor" for solar water heating has become a standard part of the solar energy literature, and is used worldwide.

### **Professional Society Activities**

Elected in late 2007 for a fourth term (of three years) as Member of the Board of Directors, International Solar Energy Society (ISES). Past Member, Board of Directors, American Solar Energy Society (ASES), from 1976 to 1991. Other positions held in ASES include Past Chairman (1978, 1982, 1984, 1985), Past Vice-Chairman (1980), and Past Treasurer (1981, 1988-1991). Mr. de Winter has been involved in many committees in ISES as well as ASES. He was Finance Chairman for the 1991 ISES World Congress in Denver, Colorado, Chairman of the 1986 ASES Annual Meeting in Boulder, Colorado, and Technical Program Chairman for the 1978 ISES World Congress in New Delhi. He is a past Member of the Board of Directors of the Solar Lobby. He is the 1983 recipient of the ASES Charles Greeley Abbot Award, a member of the Solar Energy Hall of Fame

since 1985, was designated as a Pioneer in the Field of Renewable Energy at the World Renewable Energy Congress in Denver in 1996, and is a Fellow of ASES.

### **Local Civic Activities**

He is a Past Chair of the Energy Advisory Committee, City of Santa Cruz, California, Past Commissioner of the County of Santa Cruz Energy Commission, Past Chair, Past Vice Chair and Past Treasurer of the Environmental Council of Santa Cruz County, Past Chair of the Organizing Committee of Scotts Valley Troop 604 of the BSA, Past Chair of the Board of Directors of the Open Space Alliance of Santa Cruz County, and Past Secretary - Treasurer of the Board of Directors of the Homeowners Association of the Village Circle neighborhood next to UCSC.

### **Career Overview**

1988 to present

Private consultant. Designed sample heating system for instrument for studying DNA. Developed and built Two Phase ThermoSyphon (TPTS) water heating prototypes for a US manufacturer, and for an Australian manufacturer. Investigated competing earth-coupling systems for ground coupled heat pumps. Designed supporting structures for photovoltaic panel systems in areas of high wind. Edited a major annotated bibliography volume on collectors, thermal storage, and materials, published by MIT Press. Helped develop heat exchanger equipment for the heavy oil industry, and for heating gas pipeline throttling valves.

1974 to 1988

Founder and President of Altas Corporation, in Santa Cruz, California, a company involved in solar energy and energy efficiency R&D. The staff grew to a total of 14, and the company was wrapped up in the 1980s when the limited solar energy R&D contract possibilities made it impractical to continue offering employment to a technical staff of any significance. Was in charge of engineering and sales. Developed cost effectiveness estimates of optimized collection fins in the flat plate collector. Developed equations describing the conductance between a collection fin and a liquid carrying tube. Developed new extra-efficient gas water heater concept for solar backup service. Developed cost effectiveness criteria for selective surfaces in flat plate collectors. Developed performance equations and a design methodology for heat exchangers in single loop water heating systems. Performed several surveys of R&D activities in solar energy around the world. Was involved in the arrangement of numerous conferences, and the editing of numerous conference proceedings. Was the U.S. Team Member for renewable energy, in the 1979 Joint Energy Assessment of Argentina by the Governments of the U.S.A. and Argentina.

1975 to 1985

Invited lecturer in dozens of short courses and conferences on solar energy: with University of California at Irvine; University of Colorado; Stanford University; Lawrence Livermore Laboratory; Argonne National Laboratory; West Valley College; John F.

Kennedy University; Institute of Gas Technology; Organization of American States; USIA/ICA; Northrop University; Southern California Solar Energy Assoc.; California Society for Hospital Engineering; American Society of Plumbing Engineers; Universidad Nacional Autónoma de México; Indian Institute of Technology, Madras; Colegio de Ingenieros Eléctricos, Mecánicos, e Industriales de Costa Rica; Universidad Rafael Landívar, Guatemala; Universidad Centro-Americana José Simeon Canas, San Salvador, El Salvador; Universidad Federico Santa María, Valparaiso, Chile; Universidad Nacional de Salta, Universidad Nacional de Tucumán, and Universidad Nacional de Mendoza, Argentina; and other institutions in Honduras, Bolivia, Colombia, Nicaragua, Panama, Peru, Brazil, and Trinidad. Past Member and Past Chair, Energy Advisory Committee, Santa Cruz City, Past Commissioner of the Energy Commission, Santa Cruz County.

1969 to 1974

Private Consultant.

Designed and built a 370 square foot solar collector for heating a swimming pool. Developed a manual for building such swimming pool heaters aimed at the do-it-yourself market. Investigated the use of waste heat for accelerating crop growth and extending growing season. Assisted in the development of process equipment for making small glass spheres for reflecting paints. Developed penalty factors and optimization criteria for heat exchangers in double-loop (water/antifreeze) solar collection systems. Wrote annotated bibliography on the flat plate collector published by ASHRAE.

1973 and 1974

Invited Lecturer in Thermoelectric Energy Conversion Technology. The main topics involved the analytical description of the degradation mechanisms of silicon-germanium material as used in a spacecraft Radioisotope Thermoelectric Generator (RTG).

1974

Member of the Advisory Committee on the Jet Propulsion Laboratory (JPL) study of automotive propulsion for the Ford Motor Company. Workshop Coordinator, NSF Solar Cooling Workshop.

1973 and 1974

One of the key solar energy technical people at JPL. Involved in the writing of numerous research proposals. Involved in numerous solar thermal power production studies and solar water heating studies. Involved in the reactivation of the Table Mountain Solar Energy Test Site.

1967 to 1974

Member of the Technical Staff at the Jet Propulsion Laboratory (JPL), in Pasadena, California. Was in charge of the silicon-germanium material R&D work in the Nuclear Power Sources Group of JPL. Work in this area was directed at the heat and mass transfer of degradation mechanisms, and the analysis of Radioisotope Thermoelectric Generator (RTG) operation and design, aimed at ensuring a complete (i.e. 12 year long) mission for the JPL Voyager 1 and 2 Spacecraft. Was instrumental in the development of techniques using a xenon inert cover gas in the RTG launch and pre-launch phase for the

two Voyager Spacecraft. This same RTG was later also used for the Cassini, Galileo, Ulysses, and LES 8 and LES 9 spacecraft.

1966 to 1967

Senior Engineer, Thermo Electron Corporation. Performed the original design for the solar photovoltaic power system of the Venus Mercury (Mariner 10) spacecraft of JPL. Investigated solar thermionics as a power system for this mission, developing in the process computer programs for the analytical description of parabolic dish solar concentrators using Monte Carlo ray tracing techniques.

1965 to 1966

Manager, Thermal Analysis Group, Dynatech Corporation. Performed a cost sensitivity study of the Multi-Stage Flash (MSF) desalination process, involving the development of an accurate analytical description of the process.

1963 to 1965

Manager, Thermal Systems Group, Dynatech Corporation. Developed techniques for the description of mixed diffuse-specular radiation heat transfer using Monte Carlo ray tracing techniques, for use on the Apollo spacecraft. Worked on the design of boilers for small Rankine Cycle power plants. Performed parametric cycle studies and optimum working fluid determination for vapor compression cycles. Developed heat exchanger design equations for boilers and condensers. Investigated causes and remedies for the malfunction of Freon evaporators in aircraft air conditioners. Performed liquid metal heat exchanger design. Developed an equation to describe the laminar water jet cooling process used in hot steel strip in a rolling mill. Developed "falling film" equipment for drying molten urea, later widely marketed to the chemical industries. Developed a fast freeze drying process using helium or hydrogen as a heat transfer medium. Performed studies on oil diffusion pump mechanisms. Performed air conditioning design calculations on Monsanto's "House of Tomorrow" at Disneyland.

1962 to 1963

Technical Director, Thermophysical Property Department, Dynatech Corporation. Developed many designs for adiabatic and drop calorimeters, resulting in two US patents and a number of standard instrument designs. Designed thermal conductivity equipment. Many designs are still being marketed.

1960

Visiting Lecturer at the Universidad Nacional de Tucuman in Argentina to give a short course on heat transfer mechanisms and correlations in boiling and condensation.

1959 to 1962

Teaching Staff, Massachusetts Institute of Technology. Taught an undergraduate course in engineering mechanics. Assisted in courses in heat transfer and in materials. Frequent lectures in graduate and undergraduate courses in conduction and convection heat transfer.

## Publications

1. L. C. Hoagland and F. de Winter: "Radial Thermal Conductivity Apparatus for Ceramics with Temperature Capability to 2,000 C to 2,700 C," Proceedings of the Sixth Conference on Thermal Conductivity, pp 335-368, Dayton, OH, October 1966.
2. F. de Winter, S. E. Sadek, and J. M. Reynolds: "Parametric Cost Studies of the Multi-Stage Flash Process," U. S. Dept. of the Interior, Office of Saline Water, Research and Development Report 251, March 1967.
3. L. C. Hoagland, F. de Winter and A. R. Reti: "A Continuous Adiabatic Calorimeter for Quantitative Thermal Analysis," ISA Transactions, pp 111-121, April 1967.
4. F. de Winter and G. J. Schaberg: "Intermeshing Fins as a Means of Increasing Heat Transfer Between Opposing Surfaces," ASME Paper 67-WA/HT-35, Presented at the ASME 1967 Winter Conference, Pittsburgh, PA, November 1967.
5. F. de Winter: "Study of Optimum Thermionic Diode Sizes," Jet Propulsion Laboratory, Space Programs Summary 37-49, Volume III, pp 115-117, February 1968.
6. F. de Winter: "Computer Studies of Parabolic Solar Concentrator Performance for Solar Thermionic Studies," Jet Propulsion Laboratory, Space Programs Summary 37-49, Volume III, pp 99-102, February 1968.
7. K. Shimada and F. de Winter: "Optimization of Thermionic Generator Systems of High Reliability," Proceedings of the Fifth Space Congress, pp 2.3.1-2.3.7, Cocoa Beach, FL, March 11-14, 1968.
8. B. Kan and F. de Winter: "Accelerating Freeze Drying Through Improved Heat Transfer," Food Technology, Volume XXII, # 10, pp 1269-1279, 1968.
9. F. de Winter and O. S. Merrill: "Analytical Characterization of Parabolic Solar Concentrator Performance," Paper presented at the Fourth Annual Meeting of the International Solar Energy Society (ISES), Palo Alto, CA, October 21-23, 1968.
10. O. S. Merrill and F. de Winter: "Status Report on the Solar Energy Thermionic (SET) Program at the Jet Propulsion Laboratory," Paper presented at the Fourth Annual Meeting of ISES, Palo Alto, CA, October 21-23, 1968.
11. S. E. Sadek and F. de Winter: "Sensitivity Studies in System Optimizations," Paper presented at the 1970 Joint Meeting of the AIChE and the Instituto Mexicano de Ing. Químicos, Denver, CO, 1970.
12. F. de Winter: "Five Year Master Plan for the Development and Testing of Thermoelectric Power Systems by the Nuclear Power Sources Group," JPL Report 701-68, EM 342-101, March 16, 1970.

13. F. de Winter and V. Raag: "Detailed Mathematical Models of an RTG," Proc. 1970 IECEC, pp 15-21 to 15-25.
14. F. de Winter: "The Use of Protective Gas Atmospheres in SiGe RTGs," Proc. 1971 IECEC, pp 663-672.
15. F. de Winter and G. S. Stapfer: "SiGe Technology Program at the JPL," Proc. 1972 IECEC, pp 137-148.
16. F. de Winter: "Xenon-Filled SiGe Thermoelectric Generators," JPL Quarterly Technical Review, Vol. 2, Oct. 1972, No. 3, pp 22-31.
17. F. de Winter and G. S. Stapfer: "The Behavior of Xenon When Used as a Fill-Gas in a SiGe RTG," Proc. 1973 IECEC, pp 9-12.
18. F. de Winter (ed. & coauthor), V. Raag, N. S. Elsner, L. H. Rovner, and G. S. Stapfer: "Accelerated Testing for Sublimation and Chemical Compatibility on a 4-Couple SiGe Module: Test No. 1 - Module with 80 a/o Si 20 a/o Ge, Dynaquartz Insulation," JPL Eng. Memo 342-148 (Rept. 900-488), August 13, 1971.
19. F. de Winter and W. S. Lyman: "Home-Built Solar Water Heaters for Swimming Pools," Paper EH-70, Presented at the 1973 UNESCO International Solar Energy Conference, Paris, France, July, 1973.
20. F. de Winter: "How to Design and Build a Solar Swimming Pool Heater," Manual published and distributed free of charge, starting in 1973, by the Copper Development Association, 260 Madison Avenue, 16th Floor, NY, NY 10016.
21. F. de Winter, Ed: "Proceedings of the Solar Cooling for Buildings Workshop," Report NSF-RA-N-74-063, Published by the U.S. Government Printing Office, Stock Number 3800-00189, February 1974.
22. F. de Winter: "Cost Effectiveness of a Possible Copper Product: Tapered Collection Fins of Copper in the Flat Plate Solar Energy Collector," 45 page Technical Report dated September 30, 1975, available from the Copper Development Association, 260 Madison Avenue, 16th Floor, NY, NY 10016.
23. F. de Winter: "Solar Energy and the Flat Plate Collector," ASHRAE Journal, November 1975, pp. 56-59.
24. F. de Winter: "Solar Energy and the Flat Plate Collector, an Annotated Bibliography," ASHRAE Report S-101, November 1975, ASHRAE, Atlanta, GA.
25. F. de Winter: "Heat Exchanger Penalties in Double Loop Solar Water Heating Systems," Solar Energy, Vol. 17, No. 6, 1975, pp. 335-337.

26. F. de Winter: "Determination of the Relative Cost Effectiveness of Different Absorption Coatings in the Flat Plate Collector," INCRA Report 260, International Copper Research Association, 708 Third Avenue, NY, NY 10017, December 1975.
27. F. de Winter and J. W. de Winter, Eds.: "Description of the Solar Energy R&D Programs of Many Nations," ERDA Report SAN/1122-76-1, Prepared under ERDA Contract No. E(04-3)-1122, February 1976, Available from NTIS.
28. F. de Winter: "Solar Energy Happenings in Other Countries," Proceedings of the Passive Solar Heating and Cooling Conference and Workshop, Sponsored by ERDA under Contract W-7405-Eng. 36, Report LA-6637-C, Albuquerque, NM, May 1976, pp 83-89. (This was the First National Passive Conference).
29. F. de Winter and W. S. Lyman: "Before you Plunge: Some Design Considerations that Went into a Home-Built Heater Construction Manual," Solar Age, Vol. 1, No. 5, May 1976, pp. 14-17.
30. F. de Winter and J. W. de Winter, Eds.: "Proceedings of the Second Workshop on the Use of Solar Energy for the Cooling of Buildings," ERDA Report SAN/1122-76/2, July 1976, Prepared under ERDA Contract No. E(04-3)-1122, Available from NTIS.
31. F. de Winter and L. D. Fitzgerald: "The Financial Incentives for the Fabrication of Improved Absorption Coatings for the Flat Plate Collector," Proceedings of the 1976 Conference of the American Section of the International Solar Energy Society (ISES), Winnipeg, Manitoba, Canada, August 1976, Vol. 6, pp. 216-239.
32. F. de Winter and J. W. de Winter: "Performance of a Worldwide Survey in the Research and Development of Non-Conventional Energy Sources," Report Prepared under U.N. Contract ESA-76-13301 for the United Nations ACAST Ad Hoc Working Group on Energy, September 13, 1976.
33. J. W. de Winter and F. de Winter: "Solar Energy: Present Activities and Future Potential," Paper presented at the Seminar on the Development of Non-Conventional Energy Sources, Sponsored by the Organization of American States, Port of Spain, Trinidad, November 1976.
34. F. de Winter: "Appendix to 'How to Design and Build a Solar Swimming Pool Heater,'" Altas Corp., Santa Cruz, CA, April 1977.
35. J. W. de Winter and F. de Winter: "Analysis of Existing and Ongoing Surveys in the Field of Solar Energy Conversions by the Thermodynamic Processes, as Well as Wind and Sea Energy (Including Thermal Gradient and Wave Energy)," Prepared under U.N. Contract ESA 77-195-01 for the United Nations, November 1977.

36. D. J. Morrison, J. A. Carroll, F. de Winter, and G. W. Rhodes: "California Certification Criteria for Solar Energy Equipment," Report Prepared for the California Energy Resources Conservation and Development Commission, Commission's Testing and Inspection Program for Solar Energy Equipment (TIPSE), Submitted to TRW, 1 Space Park, Redondo Beach, CA, November 1977.
37. J. A. Bereny and F. de Winter: "Survey of the Emerging Solar Energy Industry, 1977 Edition," Published and Distributed by Solar Energy Information Services, P.O. Box 204, San Mateo, CA.
38. F. de Winter and M. Cox, Eds.: "Sun: Mankind's Future Source of Energy," Proceedings of the International Solar Energy Society (ISES) Congress, New Delhi, India, January 1978, Vol. 1-3, Pergamon Press, NY, NY, 1978.
39. F. de Winter and J. W. de Winter: "International Activities in Solar Energy," Final Report on Purchase Order No. AB-8-0528-1 of the Solar Energy Research Institute, January 10, 1978.
40. F. de Winter and W. S. Lyman: "Optimum Collection Geometries for Copper Tube - Copper Sheet Flat Plate Collectors," Proc. of the ISES Congress, New Delhi, India, January 1978, Vol. 2, pp. 895-899.
41. J. D. Horel and F. de Winter: Investigation of Methods to Transfer Heat from Solar Liquid-Heating Collectors to Heat Storage Tanks," Final Report on Argonne National Laboratory Contract No. E-(04-3)-1238, April 20, 1978.
42. F. de Winter: "Heat Exchanger Operation and Design and Selection Criteria in Solar Energy Applications," Final Report on Argonne National Laboratory Contract No. 31-109-38-4187, Vol. 1 and 2, April 1978.
43. J. A. Bereny and F. de Winter: "Preliminary Overview Report on International Solar R&D & Manufacturing Activity," Final Report to the Planning Research Corporation in Support of the U.S. Domestic Policy Review on P.O. No. W4092, July 5, 1978.
44. E. F. Clark and F. de Winter, Eds.: "Proceedings of the Third Workshop on the Use of Solar Energy for the Cooling of Buildings," Meeting held in San Francisco, CA, February 1978, US DOE Report CONF 780249, Published in 1978 by the American Section of ISES, also available from NTIS.
45. F. de Winter: "A Gas Heater for Domestic Hot Water Particularly Suited to Solar Backup Service," Proc. of the August 28-31, 1978 Annual Meeting of the American Section of ISES, Vol. 2.1, pp. 594-598.
46. F. de Winter: "The Development of a Gas Backup Heating Water Tank Properly Integrated with Solar Heated Domestic Water Storage Tanks," Proc. of the Third Annual

Solar Heating and Cooling R&D Branch DOE Contractor's Meeting, Washington, DC, September 24-27, 1978, pp. 173-174.

47. N. M. Chen and F. de Winter: "On Solar-Powered Cooling Systems for Buildings," Proceedings of the IAHS International Conference, Dhahran, Saudi Arabia, December 18-22, 1978, Vol. 2, pp. 641-660.

48. F. de Winter and J. D. Horel: "Heat Exchanger Penalties in Single Loop (Antifreeze) Solar Water Heating Systems," Proc. of the August 28-31, 1978 Annual Meeting, American Section of ISES, Vol. 2.1, pp. 715-718.

49. E. F. Clark and F. de Winter, Eds.: "Proceedings of the Workshop on the Control of Solar Energy Systems for Heating and Cooling," Held in San Francisco, CA, May 1978. DOE Report CONF 7805126, Published by the American Section of ISES, also available from NTIS.

50. J. D. Horel and F. de Winter: "Investigations of Methods to Transfer Heat from Solar Liquid-Heating Collectors to Heat Storage Tanks," Final Report on US DOE Contract No. E-(04-3)-1238, March 1979.

51. F. de Winter and E. F. Clark, Eds.: "Proceedings of the Workshop on the Economic and Operational Requirements and Status of Large Scale Wind Systems," Held in Monterey, CA, March 1979, for the US DOE and EPRI, Report Conf-790352, available from NTIS.

52. P. R. Armstrong, T. L. Freeman, F. de Winter, and H. E. Grunes: "Monitoring the Performance of Solar Heated and Cooled Buildings," Vol.1: Data Acquisition Equipment for the Spectrum of Electric Utility Projects; Vol. 2: Measuring Instruments - Selection, Calibration, and Installation, Final Report on EPRI Project EP-1239, November 1979.

53. F. de Winter: "Argentina-U.S. Cooperative Assessment: Renewable Resource Evaluation Report," Topical Report Submitted to Program Management Support, Argonne National Laboratory on Contract 31-109-38-5368, January 1980.

54. P. R. Armstrong, M. Cox, and F. de Winter: "Need for an Evaluation of Hail Protection Devices for Solar Flat Plate Collectors," Altas Corp. Final Report on US DOE Contract EM-78-C-04-4291, Altas Corp., Santa Cruz, CA, March 1980.

55. F. de Winter: "Double Water Chimneys as Optimum Diode Designs for the Interconnection of a Solar DHW Storage Tank and a Gas-Fired Backup Tank," Proc. of the 1980 Annual Meeting of the American Section of ISES, Phoenix, AZ, June 1980, pp. 182-185.

56. H. E. Grunes, F. de Winter, and L.M. Kittle: "Solar-Augmented Gas-Fired Water Heater," SunWorld (of ISES), Vol. 6, No. 1, February 1982, pp. 16 - 18.

57. F. de Winter and H. E. Grunes: "The Altas Solar Augmented, Gas-Fired Domestic Water Heater," Proceedings of the 1982 Annual Meeting of the American Solar Energy Society (ASES), Houston, TX, June 1982, pp. 415-420.
58. H. E. Grunes, F. de Winter, and D. Kosar: "Design Optimization of Solar Water Heating Systems with Natural Gas-Fired Backup for the Single Family Home," American Council for an Energy-Efficient Economy (ACEEE) Conference, University of California at Santa Cruz (UCSC), August 1982.
59. H. E. Grunes, D. J. Morrison, and F. de Winter: "Development of an Advanced Solar Augmented Water Heater," Altas Corp. Final Report on GRI Contract 5014-343-0279, September 1982.
60. C. B. Winn, A. Kirkpatrick, and F. de Winter: "A Gas-Fired Heat Pipe Zone Heater for Passive Solar Buildings," Proceedings of the 8th National Passive Solar Conference (of ASES), Santa Fe, NM, September 1983, pp. 655-660.
61. F. de Winter: "Solar Collectors for Building Applications," Presented at the U.S.-Saudi Arabia Soleras Conference, Riyadh, Saudi Arabia, May 1984.
62. F. de Winter: "A Survey of European Energy Roof Systems and Their Applicability to the U.S.," Altas Corp. Final Report to EPRI on EPRI Contract RP1201-19, August 1984.
63. F. de Winter, A. A. Arata, and S. I. Icazategui: "Thermal Coupling Requirements and Possibilities of Backup Heater Tanks in Solar Hot Water Systems," Proc. of the Ninth Biennial Congress of ISES, Intersol 85, Montreal, Canada, June 23-29, 1985, Pergamon Press, NY, 1986, Vol. 1, pp. 601-605. Also in Extended Abstracts of the Intersol Conf., p. 134.
64. F. de Winter: "Economic and Policy Aspects of Solar Energy," Proc. 1985 Intersol Conf. (op cit) Vol. 4, pp. 2207-2218. Also in Extended Abstracts, pp. 511-515.
65. F. de Winter: "The Use of Passive Thermal Diodes in Water and Space Heating," Proceedings of the International Conference on Solar and Wind Energy Applications, Beijing, Peoples Republic of China, August 1985, Supplemental Papers Volume, pp. 123-130.
66. F. de Winter: "Unexplored Thermoelectric Improvement Opportunities in Silicon Boride Material," Altas Corp. Final Report to the US DOE on DOE Contract DE-AC03-85ER80224, May 15, 1986.
67. F. de Winter: "Energía Solar, Éxitos, Fracasos y Perspectivas," Paper presented at the 5th Latin American Congress of Solar Energy, Univ. Técnica Federico Santa María, Valparaiso, Chile, Oct. 27-30, 1986.

68. F. de Winter, H. J. T. Lee, V. B. Fiore, and K. G. Davidson: "Hawaiian Field Test Results on the Altas Corporation Solar Augmented Two Phase ThermoSyphon Gas-Fired Domestic Water Heater," Proc. of the ASES 1987 Annual Meeting, July 11-16, 1987, Portland, OR, pp. 280-284.
69. F. de Winter and W. S. Lyman: "CDA's Do-It-Yourself Pool Heater Doing Well After 15 Years," Solar Today, May/June 1988, pp. 13-19.
70. R. B. Swenson and F. de Winter: "NOPEC - Non-Oil Power Exporting Communities," Proc. of the 14th National Passive Solar Conference of ASES, Denver, CO, June 19-22, 1989, pp. 254-259.
71. F. de Winter: "Improvements in Active Solar Systems for Water and for Space Heating as a Result of Federal Research," Altas Corp. Final Report on Contract CA-8-00655-1 of the Solar Energy Research Institute (SERI), February 23, 1989.
72. F. de Winter: "Active Solar Water and Space Heating - Past Accomplishments and Future Needs," Proc. of Solar 89, the Annual Conf. of ASES, Denver, CO, June 19-22, 1989, pp. 105-111.
73. F. de Winter: "Using Waste Heat from Air conditioners to Heat Water in Restaurants," Copper Development Association Application Data Sheet, Greenwich, CN (now New York, NY), 1989.
74. F. de Winter, Ed.: "Solar Collectors, Energy Storage, and Materials," Vol. 5 in the MIT Press Series on "Solar Heat Technologies: Fundamentals and Applications," MIT Press, Cambridge, MA, 1990.
75. R. B. Swenson, F. de Winter, and K. Haggard: "NOPEC-II Non-Oil Power Exporting Communities," Proc. of the 15th National Passive Solar Conference of ASES, Austin, TX, March 19-22, 1990, pp. 417-421.
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77. A. A. Arata and F. de Winter: "Análisis Comportamiento Operacional de Sistemas Solares Para el Calentamiento de Agua," Loc. Cit., pp. 7-12.
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79. A. A. Arata and F. de Winter: "Design and Performance of Large Solar Water Heating Systems," Loc. Cit., pp. 1306-1312.

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