



NICKOLAS J. THEMELIS

Director, Earth Engineering Center, Columbia University (www.eecny.org); Stanley-Thompson Professor Emeritus, Earth and Environmental Engineering

*500 West 120th St., #918 Mudd, Columbia University, New York City, N.Y. 10027
Tel: (212) 854-2138; Fax: (212) 854-7081;
njt1@columbia.edu;*

BIOGRAPHY

Dr. Themelis obtained his B. Eng. (British Association Medal for Great Distinction) and Ph.D. degrees from McGill University (Montreal, Canada) in chemical engineering. In the first ten years of his career, he was Director of the Engineering Division of the Noranda Research Center in Pointe Claire where he invented and helped develop the Noranda

Process for the continuous smelting and converting of copper concentrates and recycled copper and the recovery of sulphur dioxide as sulphuric acid. At present there are several Noranda process plants operating, at Noranda (Canada), Daye (China), Shenyang (China), Port Kembla (Australia), Altonorte (Chile), and Hudson Bay (Canada). Since its inception, the Noranda process has reduced sulphur emissions from copper smelting to the atmosphere by millions of tons.

In 1972-1980, Prof. Themelis was Vice President of Technology of Kennecott Corp., the major non-ferrous company at that time. He was appointed as Professor by Columbia University (New York City, U.S.A.) in 1980 and was elected to Stanley-Thompson Chair of Chemical Metallurgy in 1988. He was chairman of the Henry Krumb School of Mines and founded Columbia's Earth Engineering Center in 1996 (www.eecny.org). In 1995, he introduced at Columbia University the teaching of industrial ecology to engineers and in 1997 led the transformation of the historic School of Mines to the new engineering discipline of Earth and Environmental Engineering and was first chairman of the new Department. (www.eee.columbia.edu).

Dr. Themelis has been consultant to industry and government in the areas of process design and management of technical resources. He is member of the U.S. National Academy of Engineering, member of the New York Academy of Sciences, Fellow of the Minerals, Metals, and Materials Society, member of the Metallurgical Society of Canada, Fellow of the Chemical Institute of Canada, member of the Materials and Energy Division of ASME, and member of International Solid Wastes Association.

Prof. Themelis is founder and Chairman of the Waste to Energy Research and Technology Council (WTERT, www.wtert.org), an international consortium of universities, companies and governmental organizations concerned with the recovery of materials and energy from industrial

and municipal wastes by means of recycling, anaerobic digestion, composting, WTE, and landfill gas capture and utilization. WTERT has sister organizations in China (www.wtert.cn), Greece (www.wtert.gr), Canada (www.wtert.ca) and Germany. The mission of WTERT and its parent organization, the Earth Engineering Center of Columbia University is the design and advancement of sustainable methods for material and energy recovery from used products. Past and ongoing EEC/WTERT projects include the design of waste management systems for New York City, Athens (Greece), Rhodes (Greece), Florence (Italy), Santiago (Chile) and Hyderabad (India). In 2004, 2006, and 2008, Prof. Themelis directed a U.S. national survey of the generation and disposition of municipal solid wastes (SOG, BioCycle journal, December 2008). This survey analyzes data submitted by the solid waste departments of the fifty states and its results are used in the USEPA's calculation of Greenhouse Gas (GHG) emissions, since 2007.

Prof. Themelis is the recipient of several professional awards (listed below), author of over 200 technical papers and four books, and inventor of twenty one patents related to high temperature processing of minerals and materials.

AWARDS

- Medal of Achievement of Solid Wastes Processing Division, American Society of Mechanical Engineers (May 2008).
- Honorary Member of the Japan Institute of Metals (March 2006)
- Environmental Conservation Distinguished Service Award of the American Institute of Mining, Metallurgical and Petroleum Engineers (AIME) (March 2004).
- ALCAN Award of Canadian Metallurgical Society (1997) for outstanding contributions to mining and metallurgy.
- Best Paper Award (Journal of Thermal Spray Technology, 2002), International Thermal Spray Society
- Best Paper Award, Metallurgical Society of Canadian Institute of Mining and Metallurgy (1993)
- Columbia University 1987 Kohnstamm Prize for Outstanding Contribution to Industrial Chemistry
- 1987 Lecturer of the British Institution of Mining and Metallurgy (1987)
- Two gold medals of the Metallurgical Society of the American Institute of Mining and Metallurgical Engineers (AIME) for best paper published (1968, 1970)
- ERCO award of the Canadian Society of Chemical Engineering (1971).
- Best Paper Award Canadian Metallurgical Society (1993)
- McConnell Environmental Award of the AIME (1984)
- Extractive Metallurgy Lecturer of AIME (1972).

LIST OF RECENT PUBLICATIONS BY NICKOLAS J. THEMELIS (2001- 2010)

1. Nakamura, M.R., Castaldi, M.J., Themelis, N.J., "Stochastic and physical modeling of motion of municipal solid waste (MSW) particles on a waste-to-energy (WTE) moving grate." *International Journal of Thermal Sciences*, 49, (6), 2010, 984-992.
2. Castaldi, M.J., and Themelis, N.J., "The Case for Increasing the Global Capacity for Waste to Energy (WTE)" *Waste & Biomass Valorization*, 1 (1), 2010, pp. 91-105.
3. N.J. Themelis and S.M. Kaufman, "Improving Methods of MSW Measurement", *BioCycle*, p.34-37. Jan. 2010.
4. Levis, J.W. Barlaz, MA., N.J. Themelis, P. Ulloa, "Assessment of the state of the food waste treatment in the USA and Canada" ,*Waste Management*, 30 (8-9), pp., 1486-1494 (2010).
5. Kaufman, S.M, N. Krishnan, N.J.Themelis, "A New Screening Life Cycle Metric to Benchmark the Environmental Sustainability of Waste Management Systems", *J. Environmental Science and Technology*, 44 (15), pp., 5949-5955 (2010)
6. Moign, A., A.Vardelle, J. G. Legoux, N.J.Themelis, "Life cycle assessment of using powder and liquid precursors in plasma spraying: The case of yttria-stabilized zirconia", *Surface & Coatings Technology* 205 (2010) p.668–673
7. Parker, N., Tittman, P., Hart, O., Nelson, R., Skog, K., Schmidt, A., Gray, E., Jenkins, B., Kaufman, S.M., N.J., Themelis, "Development of Biorefinery Optimized Biofuel Supply Curve for the Western United States", *Biomass and Bioenergy*, 34 (11), pp., 1597-1607 (2010)
8. Themelis, N.J. and Zhixiao Zhang, "Waste Energy in China", *Waste Management World*, July-August 2010, pp.40
9. Themelis, N.J. and Ljupka Arsova, "Anerobic Digestion in North America", *Waste Management World*, September-October 2010, pp. 39-42.
10. A. Moign, A.Vardelle, J. G. Legoux,N.J.Themelis, "LCA Comparison of Electroplating and Other Thermal Spray Processes", *Proceedings of the International Thermal Spray Conference*, 2009, pp 1207-1212
11. Kaufman, S.M.and N.J. Themelis, "Using A Direct Method to Characterize and Measure Flows of Municipal Solid Waste in the United States"; *J. Air & Waste Management. Assoc.* 2009. 59: 1386-1390.
12. N.J. Themelis, "Investigation of High Capital Cost of WTE facilities", *Proceedings NAWTEC 17 (North American WTE Conference)*, Chantilly, Virginia, May 18-20, 2009.
13. Fitzgerald, G. and N.J. Themelis, "Technical and Economic Impacts of Pre-shredding MSW", *Proceedings NAWTEC 17 (North American WTE Conference)*, Chantilly, Virginia, May 18-20, 2009.
14. Kaufman S. M., N. Krishnan, E. Kwon, M.J. Castaldi, N.J. Themelis, and H. Rechberger. "Examination of the Fate of Carbon in Waste Management Systems through Statistical Entropy and Life Cycle Analysis." *Environmental Science & Technology* (2008), 42(22), 8558-8563.
15. Zannes, M., Barlaz, M., Themelis, N.J. and Castaldi, M.J., "The Center for Sustainable Use of Resources: Quantifying Climate Change Impacts of Managing Wastes" *NAWTEC17, Proc. Annu. North Am. Waste Energy Conf.*, 17th Chantilly, VA, United States, May 18-20, 2009 paper# 17-2356, p. 1-7
16. Nakamura, M., Castaldi, M.J., and Themelis, N.J., "Quantitative analysis of the flow, mixing and size segregation phenomena of MSW particles on traveling grate of WTE combustion chamber" *NAWTEC17, Proceedings of the Annual North American Waste to Energy Conference*, 17th, Chantilly, VA, United States, May 18-20, 2009.
17. C.S. Psomopoulos, A. Bourka, and N.J. Themelis "Waste-to-energy: A review of the status and benefits in USA", *Waste Management (Elsevier)*, 29 (2009) 1718–1724
18. N.J. Themelis, A. Bourka, and G. Ypsilantis, "Energy and Materials Recovery from MSW at the Island of Rhodes", *Proceedings CEMEPE International Conf.*, Mykonos, Greece (June 2009).
19. C. Psomopoulos and N.J. Themelis' Potential for Mass Burn and Shredded MSW in Greece, *Proceedings CEMEPE International Conf.*, Mykonos, Greece (June 2009).

20. Arsova, L. R. van Haaren., N. Goldstein, S.M. Kaufman, and N.J. Themelis, "The State of Garbage in America", *BioCycle (Journal of Composting & Organic Recycling)*, Vol. 48, No.12, pp. 22-27, December 2008
21. Themelis, N.J., "Reducing Landfill Methane Emissions and Expansion of the Hierarchy of Waste Management", *Proceedings of Global Waste Management Symposium*, Copper Mountain, CO, September 2008
22. Themelis N.J., "The WTER Awards Nominees", *Waste Management World*, 2008-2009 Review Issue, p. 69-75.
23. Bhada, Perinaz and N.J. Themelis, "Potential for first WTE facility in Mumbai, India", *Proc. NAWTEC 16*, Paper 16-1930, Philadelphia, May 2008.
24. Themelis, N.J., " Older and Newer Thermal Treatment Technologies from a Reaction Engineering Perspective", *Conference Proceedings; International Thermal Treatment Technologies (IT3) 27th*, Air & Waste Management Association, Montreal, May 2008.
25. Lee S-H., Castaldi, M.J., and Themelis, N.J., The Effects of Varied Hydrogen Chloride Gas Concentrations on Corrosion Rates of Commercial Tube Alloys Under Simulated Environment of WTE Facilities *NAWTEC16*, *Proc. Annu. North Am. Waste Energy Conf.*, 16th Philadelphia, PA, United States, May 19-21, 2008, paper#16-1916
26. Themelis, N.J., "Developments in thermal treatment technologies", *Proc. NAWTEC 16*, Paper 16-1927, Philadelphia, May 2008.
27. Themelis N.J., "The WTER Awards Nominees", *Waste Management World*, 2008-2009 Review Issue, p. 69-75).
28. Lee , S.H, N.J. Themelis, and M.J. Castaldi, "High-temperature Corrosion in Waste-to-Energy Boilers" *Journal of Thermal Spray Technology*, vol. 16, p. 104-11, March 2007.
29. Themelis, N.J. , "Global Growth of Traditional and Novel Thermal Treatment Technologies", *Waste Management World*, Review Issue 2007-2008, p. 37-47, July-August 2007.
30. Themelis, N.J., "Gas turbine co-generation improves energy recovery from WTE plants", *Waste Management World*, Review Issue 2006-2007, pp. 97-105, August 2006 (www.waste-management-world.com/articles/print_screen.cfm?ARTICLE_ID=271249).
31. Themelis, N.J. and P. Ulloa, "Methane generation in landfills", *Journal of Renewable Energy*, 32, 2007, p. 1243-1257; www.aseanenvironment.info/Abstract/41014160.pdf, 2006.
32. Matthews, E. and N.J. Themelis, "Potential for reducing global methane emissions from landfills". *Proceedings Sardinia 2007*, 11th International Waste Management and Landfill Symposium, Cagliari, Italy, 1-5 October 2007, pp. 2000-2030, 2007.
33. Ulloa, P. and N.J. Themelis, "Doubling the Energy Advantage of Waste-to-Energy: District Heating in the U.S.", *Proc. NAWTEC 15*, p. 29-39, Miami, May 2007.
34. Themelis, N.J., *WTER: May 2006-2007 Highlights*", *Proc. NAWTEC 15*, p. 207-219, Miami, May 2007.
35. Lee, S.H., N.J. Themelis and M. J. Castaldi, "Combating Corrosion in WTE Facilities – Theory and Experience", *Proceedings of NAWTEC 14*, pp.175-185, May 2006.
36. Nakamura, M., M. J. Castaldi, N.J. Themelis, "Numerical Analysis of Size Reduction of Municipal solid Waste Particles on the Traveling Grate of a WTE Combustion Chamber", *Proceedings of NAWTEC 14 Conference*, pp.125-130, May 2006.
37. Simmons, P., N. Goldstein, S.M. Kaufman, N.J. Themelis, and J. Thompson, Jr., "The State of Garbage in America", *BioCycle Journal of Composting & Organic Recycling*, pp. 26-42, April 2006.
38. Simmons, P., S.M. Kaufman, and N.J. Themelis, "SOG Recycling Data Analysis", *BioCycle journal*, October 2006, p. 21-25 (2006).
39. Sunk, W. and N.J. Themelis, "Increasing the Quantity and Quality of Metals Recovered at Waste-to-Energy Facilities", *Proceedings of NAWTEC 14 Conference*, pp. (165-174), May 2006.

40. Themelis, N.J., "The Role of WTE in MSW Management in the US" MSW Management, pp, (142-146), September/October 2006.
41. Themelis, N.J. and Priscilla Ulloa, "Capture and Utilization of Landfill Gas", Renewable Energy 2005, WREN, pp, (77-81). (<http://www.sovereign-publications.com/renewable-energy-art.htm>).
42. Themelis, N.J. and N.A. Anid, "Mercury Emissions from Waste-to-Energy and Coal-fired Power Plants", Proceedings NAWTEC 13, American Soc. Mech. Eng., Orlando FL, p. 203-209 (2005).
43. Themelis, N.J., "The Puzzle of Drastic Reduction of Point Source Emissions and Continuing High Deposition of Mercury" in Florida, Proceedings NAWTEC 13, American Soc. Mech Eng., Orlando FL, p. 11-16 (2005).
44. Krishnan, N., and N.J. Themelis, "Life cycle environmental impacts of modern landfilling and waste-to-energy", Proceedings NAWTEC 13, American Soc. Mech Eng., Orlando FL, p. 193-201 (2005).
45. Themelis, N.J., "Emissions from WTE and coal-fired power plants in the US", Waste Management World, July-August 2005 Issue, p. 119-127 (2005).
46. Themelis, N.J., "Control of Heat Generation during Composting", BioCycle, Jan. 2005, p.28-30 (2005)
47. Themelis, N.J., "Waste Management and Waste-to-Energy in the United States", Proc. Recupero Energetico dei Rifiuti, Politecnico Milano, Piacenza (Jan.31-Feb. 3 2005).
48. Kaufman, S.M., N. Goldstein, K. Millrath, and N.J. Themelis, "The State of Garbage in America", BioCycle, January 2004, p. 31-41.
49. Themelis, N.J. and Shefali Verma, "Anaerobic Digestion of Organic Waste in MSW", Waste Management World, Jan.-Feb 2004, p. 20-24.
50. Themelis, N.J. and C. Todd, "Recycling in a Megacity", J. Air and Waste Manage. Assoc., p. 389-395, April 2004.
51. Themelis, N.J. and Scott M. Kaufman, "Waste in a land of plenty", Waste Management World, Sept-Oct 2004, p 23-28 (2004).
52. Themelis, N.J. and S.M. Kaufman, "State of Garbage in America-Data and Methodology Assessment", BioCycle, April 2004, p. 22-26.
53. Themelis, N.J., "Overview of the global waste-to-energy industry", Waste Management World, July-Aug. 2003, p. 40-47.
54. Themelis, N.J., "Analyzing data in State of Garbage in America, and in EPA reports", BioCycle 44, no. 1 (2003): 22-25.
55. Millrath, K., and N.J. Themelis, "Current Trends in the Waste to Energy Industry", Proc. ASME International Congress, Washington, D.C. (November 2003).
56. Albina, D. O. and N.J. Themelis, "Emissions from Waste-to-Energy: A Comparison with Coal-fired Power Plants", 2003 ASME International Mechanical Engineering Congress & Exposition, 2003; (IMECE2003-55295).
57. Klein, A. and N.J., "Energy Recovery from Municipal Solid Wastes by Gasification", NAWTEC 11 Proceedings, ASME International, Tampa FL (April 2003).
58. Klein, A., Zhang, H., and N.J. Themelis, "Analysis of a Waste-To-Energy Power Plant with CO2 Sequestration", NAWTEC11 Proceedings, ASME International, Tampa FL (April 2003), p. 263-270.
59. Millrath, K. and N.J. Themelis, "Waste as a Renewable Source of Energy", 2003 ASME International Congress (IMECE2003-55258).
60. Nakamura, M., Zhang, H., Millrath, K., and N.J. Themelis, "Modeling of Waste-to-Energy Combustion with Continuous Variation of the Solid Waste Fuel", 2003 ASME International Congress 2003; (IMECE2003-55342).
61. Themelis, N.J. "A New Resource: The Waste-to-Energy Research and Technology Council", North American Waste to Energy Conference (NAWTEC 11) Proceedings, ASME International, Tampa FL (April 2003) (2003): 241-252.

62. Themelis, N.J. and P. Deriziotis, "Substance and perceptions of environmental impacts of dioxin emissions", NAWTEC 11 Proceedings, Tampa FL (April 2003) (2003): 225-230.
63. Themelis, N.J., "An overview of the global waste-to-energy industry", Waste Management World (2003): 40-47.
64. Klein, A., H. Zhang, and N.J. Themelis, "Analysis of a Waste-To-Energy Power Plant with CO₂ Sequestration", NAWTEC 11 Proc., Tampa FL, 263-270 (April 2003).
65. Klein, A. and N.J. Themelis, "Energy Recovery from Municipal Solid Wastes by Gasification", NAWTEC 11 Proceedings, Tampa FL, p.241-252 (April 2003).
66. Themelis, N.J., Y.H. Kim, and M.H. Brady, "Energy recovery from New York City municipal solid wastes", Waste Management & Research 20, no. 3 (2002): 223-233.
67. Themelis, N.J., "Integrated Management of Solid Wastes for New York City", NAWTEC 10 Proceedings, Philadelphia, (April 2002) (2002).
68. Themelis, N.J. and A. Gregory, "Mercury Emissions from High Temperature Sources in Hudson Basin", Proceedings NAWTEC 10, ASME International, p. 205-215 (May 2002).
69. Themelis, N.J., "The environmental impacts: Assessing waste-to-energy and landfilling in the US", Waste Management World (2002): 35-41.
70. Themelis, N.J. and Young Hwan Kim, "Material and Energy Balances in a Large-scale Anaerobic Bioconversion Cell", Waste Management and Research (2002): 234-242.
71. Themelis, N.J., Steven Cohen, and Greg Frankel, "Life After Fresh Kills: Moving Beyond New York City's Current Waste Management Plan", Engineering and Public Affairs Joint report to Mayor M. Bloomberg, December 2001, 66 pages. (www.columbia.edu/~sc32/documents/Columbia_University_Final.pdf).
72. N.J. Themelis and A.F. Gregory, "Sources and Material Balance of Mercury in the NY-NJ Harbor", New York Academy of Sciences, Nov. 2001.
73. T. H. Wakeman and N.J. Themelis, "A basin-wide approach to dredged material management in New York/New Jersey Harbor", J. Hazardous Materials, 85, pp 1-13, 2001.
74. B. Dussoubs, A Vardelle, G. Mariaux, N.J. Themelis, "Modeling of plasma spraying of two powders", J. of Thermal Spray Technology, March 2001, 10, No.1, pp.105-110.
75. M. Vardelle, A. Vardelle, P. Fauchais, K-I. Li, N.J. Themelis, "Controlling particle injection in plasma spraying", Journal of Thermal Spray Technology, June 2001, 10, no 2, pp 267-286. (002 Best Paper Award of International Thermal Spray Society).
76. Vardelle, H. Zhang, N.J. Themelis, "Modeling of in-flight oxidation and evaporation of plasma-sprayed iron particles", Proceedings, 15th International Symposium on Plasma Chemistry, 9-13 July 2001, Orléans, France, vol 2, pp 311-318.
77. N.J. Themelis and Y.H. Kim, "Energy Recovery: An essential tool of integrated waste management", Proc. 33rd Mid-Atlantic Industrial and Hazardous Wastes Conference, Manhattan College, 2001, p.89-103.
78. N.J. Themelis and H.Y. Kim, "The Aerobic bioconversion cell", Proc. 33rd Mid-Atlantic Ind. and Hazardous Wastes Conference, Manhattan College, 2001, p. 124-129.