越南溫室氣體減量政策實施優先度評估之研究

黃瓊蘭、李康文

E-mail: 9607866@mail.dyu.edu.tw

摘 要

氣候變遷將對人類生活造成許多負面的影響（包含農業、生物多樣性、人體健康等等…），最後的結果和一些國家的經濟發展、群眾生命有著密切的關係，特別是對於開發中又位於沿海地區的國家將會是個嚴重的影響。根據世界銀行報告指出，越南將會是其中－個受氣候變遷而導致海平面嚴重上升的開發中國家。如果海平面上升1公尺，越南全國將會有10.8%的人口受到影響；若是上升5公尺，影響的人口將會達到35%。另外海平面的上升，將會嚴重影響到越南國內的GDP（36%），緊接著將會衝擊到人口密集的都會區（41%）。 本研究是通過由Saaty所開發的分析層級程序法（AHP）論及上述問題的運用，本研究採用AHP方法作為評估在越南推動不同溫室氣體減量方案的優先度。本研究建立四項評估因素：能源、產業、運輸與其他部分。每項評估因素下各建立三項評估準則（能源部門有減少煤炭消耗量、增量可再生能源和碳稅機制。產業中有嚴密的排放及效率的標準，控制傳統產業發展和推動節約能源機制。運輸部門則是升級公共交通系統，設定新的排放標準和增量生質燃料消耗量。在其他領域有控制林業覆蓋面，強化農田灌溉用水管理且加強全面廢棄物管理系統）和兩個減量模式方案【依現況自然發展（BAU）與積極推動減量（ARM）】。 分析結果顯示工業部門被視為越南溫室氣體首要的減量對象（權重值為36.9%），其次是運輸部門（30.7%），第三是能源部門（23.9%），其他部門比重最低（8.5%）。對越南而言這結果反映了合理的現實情況，因為現在工業部門消耗超過40%的能量。分析結果亦顯示在各項評估準則中，嚴密的排放標準及提升公共交通是緩和溫室氣體的二種最佳的方式（各權重皆約為18.4%）；其次是減少煤炭消耗量佔12.8%，其餘各項總計佔50.4%；權重值最低的活動是在其他部門之下的強化農田灌溉用水管理，只佔1.4%。 方案B（積極推動減量），包括減少溫室氣體排放與84.4%優先權重。方案A（依現況自然發展）的決策分析權重是15.6%。因受研究執行條件之限制，大多數的專家問卷受訪者都是越南籍環境專家，因而評估結果大幅傾向B方案是顯而易見的。

關鍵詞 : 溫室氣體（GHGs）、氣候變遷、分析層級程序法（AHP）、越南

目錄

參考文獻

1. Al Harbi, K. M., 2001. Application of AHP in project management, International Journal of Project Management 19 (4):19-27. 2. Andijani, A. A., Anwarul, M., 1997. Manufacturing blocking discipline: A multi-criterion approach for buffer allocations, International Journal of Production Economics 51 (3):155-163. 3. Asian Development Bank, 2005. Technical Assistance, Socialist Republic of Viet Nam: Air Pollution, Poverty, and Health Effects in Ho Chi Minh City (Financed by the Poverty Reduction Cooperation Fund). 4. Berrittella, M., Certa, A., Enea, M. and Zito, P., 2007. An Analytic Hierarchy Process for The Evaluation of Transport Policies to Reduce Climate Change Impacts. 5. Beynon M., 2002. DS/AHP method: A mathematical analysis, including analysis on understanding of uncertainty, European Journal of Operational Research 140 (1):148-164. 6. Cagno, E., F. Caron, Perego, A., 2001. Multi-criteria assessment of the probability of winning in competitive bidding process, International Journal of Production Management 19:313-324. 7. Daniel, S.E., Tsoulfas, G. T., Pappis, C. P., Rachaniotis, N. P., 2004. Aggregating and evaluating the results of different Environmental Impact Assessment methods, Ecological Indicators 4:125-138. 8. Dasgupta, S., Laplante, B., Meisner, C., 2007. Wheeler, D. and Yan, J., the Impact of Sea Level Rise on Developing Countries: A Comparative Analysis. 9. Dey, P. K., 2002. An integrated assessment model for cross – country pipelines, Environmental Impact Assessment Review 22:703-721. 10. Hoang, Duong Tung, 2004. Air pollution in Vietnam. 11. Hydrometeorological Service of Vietnam Hanoi, 1999. Economics of Greenhouse Gas Limitations. 12. Kengpol, A., O_Brien, C., 2001. The development of a decision support tool for the selection of an advanced technology to achieve rapid product development, International Journal of Production Economics 69 (2):177-191. 13. Korpela, J., Tuominen, M., 1996. A decision aid in warehouse site selection, International Journal of Production Economics 45 (1 – 3):169-180. 14. Kreng, V. B., Wu, Chao-Yi, 2007. Evaluation of knowledge portal development tools using a fuzzy AHP approach: The case of Taiwanese stone industry, European Journal of Operational Research 176:1795-1810. 15. Kuo, R.J., Chi, S.C., Kao, S.S., 1999. A decision support system for locating convenience store through fuzzy AHP, Computers and Industrial Engineering 37 (1 – 2):323-326. 16. Lai, V., Wong, B.K., Cheung, W., 2002. Group decision making in a multiple criteria environment: A case using the AHP in the software selection, European Journal of Operational Research 137 (1):134-144. 17 Le, Thong Quang and Nguyen, Ngoc Anh, 2004. Incentives for wastewater management in industrial estates in Vietnam. 18. Levary R.R., Wan K., 1999. An analytic hierarchy process based simulation model for entry mode decision regarding foreign direct investment, Omega 27 (6):661-677. 19. Liqa Raschid-Sally, Wim van der Hoek and Mala Ranawaka, 2001. Wastewater Reuse in Agriculture in Vietnam: Water Management, Environment and Human Health Aspects. 20. Miyaji, I., Nakagawa, Y., Ohno, K., 1995. Decision support system for the composition of the examination problem, European Journal of Operational Research 80 (1):130-138. 21. Ngai, E.W.T., Chan, E.W.C., 2005. Evaluation of knowledge management tools using AHP, Expert Systems with Application 29:889-899. 22. Nguyen, Hoan Thi, 2001. Vietnam Country Report for Waste Not Asia conference, Taipei. 23. Nguyen Thao, Solid Waste Management in Vietnam. 24. Ong, S.K., Koh, T.H., Nee, A.Y.C., 2001. Assessing the environmental impact of materials processing techniques using an analytical hierarchy process method, Journal of Materials Processing Technology 113:424-431. 25. Ramanathan, R., 2001. A note on the use the analytic hierarchy process for environmental impact assessment, Journal of Environmental Management 63:27 – 35. 26. Ramanathan, R., Ganesh, L.S., 1995. Using AHP for resource allocation problems, European Journal of Operational Research 80 (2):410-417. 27. Rossetti, M. D., Selandari, F., 2001 Multi-objective analysis of hospital delivery systems, Computers and Industrial Engineering 41 (3):309-333. 28. Saaty T.L., 1980. The Analytic Hierarchy Process, Mc Graw – Hill. 29. Schaefer, D., 2003. Recent climate changes and possible impacts on agriculture in Vietnam with regard to the RRD. 30. Shaw, T. L., Lennard, D. E. and Jones, P. M. S., 2001. Policy and Development of Energy Resources. 31. Singpurwalla, N., Forman, E., Zalkind, D., 1999. Promoting shared health care decision making using the analytic hierarchy process, Socio-Economic Planning Sciences 31:277-299. 32. Socialist Republic of Vietnam, Ministry of Natural Resources and Environment, 2003. Vietnam Initial National Communication. 33. Statistical publishing house, 2005 Statistical Yearbook of Vietnam. 34. Statistical publishing house, 2005. Vietnamese industry in 20 years of renovation and development. 35. Susmita Dasgupta, Benoit Laplante, Craig Meisner, David Wheeler and Jianping Yan, 2007. The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis, World Bank Policy Research Working Paper 4136. 36. Yurdakul, M., 2004. AHP as a strategic decision-making tool to justify machine tool selection, Journal of Materials Processing Technology 146:365-376. 37. Vietnam Environmental Protection Agency, 2004. Vietnam Environment monitor – Solid waste. 38. Vietnam Environmental Protection Agency, 2005. Vietnam Environmental State. 39. UNEP, Third ASEAN State of the Environment Report 2006. 40. The official website of Viet Nam Ministry of Agriculture and rural development http://www.agroviet.gov.vn/portal/page?_pageid=35,1&_dad=portal&_schema=PORTAL 41. Singapore Ministry of the Environment and Water resources http://app.mewr.gov.sg/home 42. Ho Chi Minh city, Operation and Management Public Transportation of Center http://www.buyttphcm.com.vn/Loigioithieu.asp 43. Carbon Tax Centre http://www.carbontax.org/ 44. Republic of the Philippines – Department of Environment and Natural Resources http://www.denr.gov.ph/ 45. Malaysia - Ministry of Natural Resources and Environment http://www.doe.gov.my/index.php?option=com_frontpage&Itemid=1&lang=en 46. National Goal Program of saving and efficiency energy consumption http://www.eec.moi.gov.vn/Index.aspx 47. United States Energy Information Administration http://www.eia.doe.gov/ 48. Wikipedia http://en.wikipedia.org/wiki/Carbon_tax 49. U.S. Environmental Protection Agency http://www.epa.gov/ 50. Environmental Protection Administration Executive Yuan R.O.C http://www.epa.gov.tw/english/ 51. Vietnam Electricity http://www.evn.com.vn/ 52.

Vietnam general Statistic Office http://www.gso.gov.vn/Default.aspx?tabid=217 53. Asian Trans – " Improve public transit in Hanoi through 3 mode bus lines http://www.hanoibus.com/ 54. Intergovernmental Panel on Climate Change http://www.ipcc.ch/ 55. Vietnam Forest Protection Department http://www.kiemlam.org.vn/ 56. Vietnam Ministry of Industry http://www.moi.gov.vn/News/Main.asp 57. Vietnam Ministry of Natural Resources and Environment http://www.monre.gov.vn/monreNet/Default.aspx?tabid=231 58. Vietnam Environmental Protection Agency http://www.nea.gov.vn/ 59. Thailand Ministry of Natural Resources and Environment http://www.pcd.go.th/info_serv/en_reg_std_airsnd03.html 60. Vietnam Directorate for Standards and quality http://www.tcvn.gov.vn/ 61. Global Geographic http://www.theodora.com/wfbcurrent/vietnam/ 62. Tiempo Climate Cyberlibrary http://www.tiempocyberclimate.org/portal/archive/vietnam/index.htm 63. United Nations Environment Program http://www.unep.org/ 64. United Nations Framework Convention on Climate Change http://unfccc.int/2860.php 65. Vietnam Cleaner Production Center http://www.vncpc.org 66. Vietnam national Coal – Mineral Industrial Group http://www.vinacoal.com.vn/ 67. Vietnam Register http://www.vr.org.vn/