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## Résumé

**Citizenships** : French and Canadian

**Date of birth**: 26 August 1940

Alain Haurie has been professor of *Quantitative Methods* at the Graduate Business School of the University of Montreal, Canada (1963-89). From 1989 to 2005 he was professor of *Operations Research* in the department of management studies (HEC) of the University of Geneva, Switzerland. During his academic career he has occupied positions of department chairman (1974-1976 in Montreal, 1989-1992 in Geneva) and has been the founder and first director of a research center dedicated to decision analysis (GERAD in Montreal 1980-1989) which became one of the leading research center in Canada for Operations Research. With Jean-Philippe Vial he has created in 1990, LOGILAB, a research laboratory that fosters Operations Research and Decision Science modeling in the domain of logistics and energy/environment.

He has authored or co-authored over 150 scientific papers and co-authored 9 books. He has been in charge of orienting continuing education programs at the university of Geneva (1996-2001). During various academic leaves he has also taught at Ecole Polytechnique de Montréal (1970-74), INSEAD, Rabat, Morocco (1976-1978), University of California, Berkeley, USA (1980), Victoria University, Wellington, New-Zealand (1993), Ecole des Mines de Nantes, France (1993-1995).

At University of Geneva he has taught *Operations Research, Decision Science, Energy and Environmental Management* in various undergraduate and graduate programs. He was also the director of a continuing education program on "*environmental management for the firms*". He has directed several research projects dealing with the economics of energy and environmental management. From 2000 to 2005 is has been the director a large project of the *Swiss Virtual Campus* program to implement a distance learning modular course on sustainable development. Over the same period he has been the leader of a research group (nccr-"*climate*") funded by the Swiss NSF to work on the economics of climate change.

In 1985 he has participated in the creation of HALOA inc., a consultancy firm based in Montreal and which specializes in the modeling and analysis of the interactions between energy and the environment. In 2002 he has participated in the creation of ORDECSYS a consultancy firm based in Geneva, Switzerland.

**Experience in energy modeling**: Alain Haurie has initiated, with Richard Loulou in 1980, the development of MARKAL models for Canadian Provinces and developed, under contract for the *Canadian Ministry of Energy-Mines and Resources*, different versions of the model describing energy intensive sectors of the Canadian economy. He has supervised several doctoral theses concerning the

modeling of economy-energy-environment interactions. Since 1988 he has supervised several theses dealing with the building of multi-country MARKAL models, regional versions of the model (at the level of a Swiss canton) and the coupling of MARKAL models with air pollution (at the local scale) or climate (at a global scale) models. He has also developed several models for energy markets with uncertainty and imperfect competition. Alain Haurie has been consultant in energy modeling for several firms and organizations in Canada, France, Switzerland and for OECD. Currently, as Director of ORDECSYS, he is involved in several applied research and consultancy projects dealing with the management of power utilities in the context of the European energy markets.

### Education

Bsc Mathematics, Algiers 1962

Doctorat de 3ème cycle in Applied Mathematics, Paris, France 1970

Doctorat d'Etat Physics (Control Theory), Paris, France 1976

### Experience Record

2002-Present Director and co-founder of ORDECSYS Sarl

2000-2004 Leader of the Module "Risk Assessment" in the Swiss NSF NCCR-"Climate"

1989-2005 Ordinary Professor of Operations Research, HEC-Genève, University of Geneva

1963-1989 Professor of Quantitative Methods at HEC-Montreal

1987-2004 Co-founder of HALOA Inc.

1982-Present Founding member of GERAD (inter-university research center based in Montreal Canada)

### Honours

- Professeur honoraire (emeritus) Université de Genève
- Professeur associé de méthodes quantitative HEC-Montréal, Canada
- Fellow of the Royal Society of Canada, Academy of Humanities and Social Sciences.
- President of the International Society of Dynamic Games, 1994-1998 .
- Member of grant selection committee (OR and Industrial Engineering) NSERC-Canada, 1985-1988 and 1999-2002.

### Editor of scientific journals

- Guest editor (Environmental Modeling and Assessment)
- Guest editor (Computational Management Science)
- Guest editor (automatica)
- Guest editor (Computational Management Science)
- Editor (Management and Decision Sciences ) for the IFAC Journal AUTOMATICA . ended in 2004
- Associate Editor for the Journal Environmental Modeling and Assessment .
- Associate Editor for the Journal of Economic Dynamics and Control .
- Associate Editor for the Journal Discrete Event Dynamic Systems: Theory and Applications .
- Associate Editor for the Series Annals of the International Society of Dynamic Games .
- Associate Editor for the Journal International Game Theory Review
- Associate Editor for the Journal International Management .

### Direction of research projects (since 1995 only)

#### EU Projects and France GICC

- AIDAIR. a EUREKA project which aimed to develop an integrated system to assess air quality management in urban regions. 1995-1997.
- EU-FP4 MUTATE. An EU project concerning distance learning and training for developing GIS applications for environmental management. The part of the project directed by A. Haurie concerned the use of GIS in energy/technology choice models. 1997-2000.
- EU-FP5 SUTRA, *Sustainable urban transportation*. An EU project aiming at integrating different modeling approaches to assess urban transport development scenarios in different European cities (Lisbon, Geneva , Genoa, Thessalonica, Tel Aviv). The part of the project directed by A.

Haurie concerned the modeling of energy/technology choices in the urban transport sector. 2000-2003.

- EU-FP6 TOCSIN (leader EPFL) *Technology-Oriented Cooperation and Strategies in India and China: Reinforcing the EU dialogue with Developing Countries on Climate Change Mitigation* 2007-2009
- EU-FP-7 PLANETS (leader FEEM) *Probabilistic long term assessment of new energy technology scenarios*. 2008-2010
- EU-FP-7 ERMITAGE (leader OPEN U.) 2010-2013. *Enhancing Robustness and Model Integration for The Assessment of Global Environmental Change*.
- GICC-(leader IFRI). 2004-2006
- GICC-(leader KANLO) *Simulation de stratégies de négociation post-Kyoto dans un régime climatique international fragmenté* 2007-2008.
- GICC-(leader KANLO) Synscop15 2008-2010. an interactive assessment tool for the COP-15 and ensuing negotiations. [http:// synscop15.ordecys.com/](http://synscop15.ordecys.com/)
- GICC-(leader KANLO) ETEM-AR 2010-2012. *Modéliser l'atténuation et l'adaptation dans le secteur de l'énergie*. <http://etem-ar.ordecys.com/>

## Swiss-NSF

- *Metamodeling approach for air quality modeling*. This research aimed to develop a method to couple an energy/technology choice model applied to an urban region (MARKAL-Lite) with a 3D (Eulerian) local pollution model. 1998-2001.
- *NCCR-Climate*. As part of a strategic research program of the Swiss NSF (NCCR-"Climate" of the *National centers of competence in research*), Alain Haurie has been leader of the module "economic response and risk assessment". This module concerned the following topics: integrated assessment models; economics and risk hedging modeling; socio-economic aspects and acceptability of climate policies. 2001-2005.

## OFES (Swiss Confederation)

- *SUPPREM*. As part of the Swiss virtual campus program, Alain Haurie has directed a large project to develop a multi lingual virtual campus on the theme : "Sustainability and public or private environmental management". This project involved 5 universities in Switzerland and a participation of a group from UNCTAD. It has produced an ensemble of teaching and training modules that can serve to assemble in a flexible way different courses presenting sustainable development issues. The modules concerned with energy techno-economic modeling has been used several years in a graduate management program of the University of Geneva. 2001-2004.
- *OFEN RITES* project. 2011-2012.

## Publications

Articles : Only those published after 1985.

1. Babonneau, A. Haurie and M. Vielle. A Robust Meta-Game for Climate Negotiations, *Computational Management Science*, Vol. 13, pp. 1-31, 2013.
2. Haurie A., F. Babonneau, N. Edawrds, P. Holden, A. Kanudia, M. Labriet, M. Leimbach, B. Pizzileo and M. Vielle. Fairness in Climate Negotiations: a Meta-Game Analysis Based on Community Integrated Assessment, *Oxford University Press Handbook on the macroeconomics of climate change*, to appear.
3. Babonneau F., A. Haurie, G. J. Tarel, and J. Thénicié. Assessing the future of renewable and smart grid technologies in regional energy systems. *Swiss Journal of Economics and Statistics*, 148(2):229–273, 2012.
4. Haurie A. and M. Tavoni and B. van der Zwaan, eds. 1-5. Modeling Uncertainty and the Economics of Climate Change: Recommendations for Robust Energy Policy Special Issue: Modeling Uncertainty and the Economics of Climate Change: Recommendations for Robust Energy Policy. *Environmental Modeling and Assessment Numbers 1-2 / March 2012* pp 1-5.
5. Frédéric Babonneau, Alain Haurie, Richard Loulou and Marc Vielle. Combining Stochastic Optimization and Monte Carlo Simulation to Deal with Uncertainties in Climate Policy Assessment. *Environmental Modeling and Assessment Numbers 1-2 / March 2012* pp. 51-76

6. Haurie A. and M. Vielle, A Metamodel of the Oil Game under Climate Treaties, *INFOR*, vol. 48, num. 4, p. 215-228, 2011.
7. Babonneau F., A. Haurie, R. Loulou and M. Vielle, Combining stochastic optimization and Monte-Carlo simulation to deal with uncertainties in Climate Policy Assessment, *Environmental Modeling and Assessment*, special issue on Modeling Uncertainty and the Economics of Climate Change: Recommendations for Robust Energy Policy, Haurie A., M. Tavoni, B. van der Zwaan, eds. to appear.
8. Drouet L., A. Haurie, J.-P. Vial and M. Vielle, A game of international climate policy solved by a homogenous oracle-based method for variational inequalities, in M. Breton, K. Szajowski eds., *Advances in Dynamic Games*, Vol 11 *Annals of the International Society of Dynamic Games*, Birkhäuser, pp.469-488, 2010
9. Filar J.A: and A. Haurie, OR/MS and environmental decision making under uncertainty, in J.A. Filar and A. Haurie eds., *Uncertainty and environmental Decision Making, A Handbook of Research and Best Practice*, Springer, International Series in Operations Research and Management Science, 2010.
10. Bahn O., A. Haurie and R. Malhamé, A stochastic control/game approach to the optimal timing of climate policies, in J.A. Filar and A. Haurie eds., *Uncertainty and environmental Decision Making, A Handbook of Research and Best Practice*, Springer, International Series in Operations Research and Management Science, 2010.
11. Bahn O. and A. Haurie, A Class of Games with Coupled Constraints to Model International GHG Emission Agreements. *International Game Theory Review*, to appear, 2009.
12. Bahn O., A. Haurie and R. Malhamé, A stochastic control model for optimal timing of climate policies, *automatica* June 2008.
13. Haurie A. and F. Moresino, Singularly perturbed piecewise deterministic games, *SIAM Journal on Control and Optimization*, Vol. 47, No. 1, pp. 73–91, 2008.
14. A. Haurie, M. Vielle, "Le cartel du pétrole et les politiques climatiques mondiales: une analyse par la théorie des jeux." in Prof. Dr Ruth Kaufmann, Prof. Dr. Paul Burger and Martine Stoffel (eds.), *Recherche dans le développement durable - perspectives des sciences sociales et humaines* Académie suisse des sciences sociales et humaines, 2007.
15. Haurie A. and F. Moresino, Two-time scale controlled Markov chains: a decomposition and parallel processing approach, *IEEE Transactions on Automatic Control*, Vol. 52, Issue: 12 pp. 2325-2331 Dec. 2007.
16. Bernard A., A. Haurie, M. Vielle and L. Viguier. A two-level dynamic game of carbon emission trading between Russia, China, and Annex B countries, *Journal of Economic Dynamics & Control*, 2007.
17. Drouet L., Haurie A., Moresino F., Vial J.-P., Vielle M. and Viguier L., An oracle based method to compute a coupled equilibrium in a model of international climate policy, *Computational Management Science*, Vol. 5 (1–2) pp. 119-140, 2008.
18. Babonneau, F. and Beltran, C. and Haurie, A. and Tadonki, C. and Vial, J.-P., "Proximal-ACCPM: a versatile oracle based optimization method", In *Optimisation, Econometric and Financial Analysis*, E. J. Kontoghiorghes editor, vol. 9 of *Advances in Computational Management Science*, 2006.
19. Bahn, O. and Drouet, L and Edwards, N.R. and Haurie, A. and Knutti, R., Kypreos, S., Stocker, T.F. and Vial, J.-P., (2006), "The coupling of optimal economic growth and climate dynamics", *Climatic Change*, Volume 79, Numbers 1-2 /, pp. 103-119, November, 2006.
20. Beltran C., N. R. Edwards, A. Haurie, J.-P. Vial, and D. S. Zachary. Oracle-based optimisation applied to climate model calibration. *Environmental Modelling and Assessment*, 11(1):31-43, 2006.
21. Viguier L., Barreto L., Haurie A., Kypreos S., Rafaj P., Modeling Endogenous Learning and Imperfect Competition Effects in Climate Change Economics, *Climatic Change*, Volume 79, Numbers 1-2 /, pp. 121-141, November, 2006.
22. Drouet L., N.R. Edwards and A.Haurie, Coupling Climate and Economic Models: A Convex Optimization Approach, *Environmental Modeling and Assessment*, Vol.11, pp.101-114, 2006.
23. Haurie A., A Stochastic Multi-Generation Game with Application to Global Climate Change Economic Impact Assessment, *Annals of the International Society of Dynamic Games*, Vol. 8 pp 393-308, 2006.
24. Viguier L., Vielle M., Haurie A., Bernard A., A Two-level Computable Equilibrium Model to Assess the Strategic Allocation of Emission Allowances within the European Union, *Computers & Operation Research*, Vol. 33, pp- 369-385, 2006.
25. Haurie A., A Multi-Generational Game Model to Analyze Sustainable Development, *Annals of Operations Research*, Vol. 8 pp 369-386, 2006.
26. Haurie A. and F. Moresino, Computing equilibria in stochastic game models of intergenerational equity, *International Game Theory Review*, Vol. 8 No 2 pp 273-294, 2006.
27. Haurie A. and F. Moresino, A stochastic control model of economic growth with environmental disaster prevention, *automatica*, Vol. 42 No 8 pp 1417-1428, 2006.

28. Haurie A., F. Moresino and L. Viguier, A Two-level Differential Game of International Emissions Trading, *Annals of the International Society of Dynamic Games*, Vol. 8 pp 309-332, 2006.
29. Haurie A. and G. Zaccour, S-adapted equilibria in games played over event trees: an overview, in A.S. Nowak et al. eds. *Advances in Dynamic Games*, *Annals of the International Society of Dynamic Games*, Vol. 7, pp. 417-444, 2005.
30. Haurie A. and L. Viguier (eds.), *The Coupling of Climate and Economic Dynamics*, Springer 383 pages, 2005.
31. Drouet L., A. Haurie, M. Labriet, P. Thalmann, M. Vielle and L. Viguier, A Coupled Bottom-up/Top-down Model for GHG Abatement Scenarios in the Swiss Housing Sector, in R. Loulou, J.-P. Waaub and G. Zaccour (eds.), *Energy and Environment*, GERAD 25<sup>th</sup> Anniversary series, pp. 27-62, 2005.
32. Edwards N., H. Greppin, A. Haurie and L. Viguier, Linking Climate and Economic Dynamics, Chap. 1 in A. Haurie and L. Viguier (eds.), *The Coupling of Climate and Economic Dynamics*, Springer pp. 1-33, 2005.
33. Beltran C., L. Drouet, N. R. Edwards, A. Haurie, J.-P. Vial and D. S. Zachary, An Oracle Method to Couple Climate and Economic Dynamics, Chap. 3 in A. Haurie and L. Viguier (eds.), *The Coupling of Climate and Economic Dynamics*, Springer, 2005.
34. Carlson D., Haurie A., J.-P. Vial and Zachary D.S., Large scale convex optimization methods for air quality policy , *Automatica*, pp. 385–395, January 2004.
35. Haurie. A. , Integrated Assessment Modeling for Global Climate Change: an Infinite Horizon Optimization Viewpoint, *Environmental Modeling and Assessment*, Vol.-8, No. 3, pp.117-132, 2003.
36. Haurie A. and L. Viguier , A Stochastic Dynamic Game of Carbon Emissions Trading, *Environmental Modeling and Assessment*, Vol.-8, No. 3, pp.239-248, 2003.
37. C. Borrego, A. I. Miranda, J. Valente, M. Lopes, J.M. Couto, A. Haurie, A. Dubois & L. Drouet, Studying the impact of urban sustainable transportation on Lisbon air quality, in C.A Brebbia & F. Patania eds. *Air Pollution XI*, pp. 583-592, WIT Press, Southampton, 2003.
38. Haurie A., J. Kübler, A. Clappier and H. vanden Bergh , A Metamodeling Approach for Integrated Assessment of Air Quality Policies, *Environmental Modeling and Assessment*, Vol. 9, pp. 1-12, 2003.
39. P. Caratti, A. Haurie, D. Pinelli, D.S. Zachary, Exploring the Fuel Cell Car Future: an Integrated Energy Model at the City Level, in L. J. Sucharov, and C. A. Brebbia eds., *Urban Transport IX*, Proceedings Urban Transport 2003, Ninth International Conference on Urban Transport and the Environment in the 21st Century, 10 - 12 March 2003 Crete, Greece, WIT Press, Southampton, 2003.
40. Haurie A., Turnpikes in Multidiscount Rate Environments and GCC Policy Evaluation, in G. Zaccour Ed., *Optimal Control and Differential Games*, Kluwer 2002
41. Haurie A, Time, Risk and Conflicts in Economics and Management Science: a Story about Turnpikes, in G. Zaccour Ed., *Decision and Control in Management Science*, Kluwer 2002.
42. Haurie A. and Moresino F., S-adapted Oligopoly Equilibria and Approximations in Stochastic Variational Inequalities', *Annals of Operations Research*, Vol. 114, pp. 183-201, 2002.
43. Haurie A. and Moresino F. , A Differential Game of Debt Contract Valuation, in M. Dror, P. L'Ecuyer and F. Szidarovsky, *Modeling Uncertainty*, Kluwer 2002.
44. Haurie A. , Moresino F., and Vial J.-P. Singularly Perturbed Hybrid Control Systems Approximated by Linear Programs', in Z. Hou, J. Filar and A. Chen Eds. *Markov Processes and Controlled Markov Chains* , Kluwer, 2002.
45. Haurie A., Cooperative differential games: an historical perspective, in E. Altman and O. Pourtallier eds., *Annals of the International Society of Dynamic Games*, Vol. 6, 2002.
46. Haurie A. and Moresino F., Computation of S-adapted Equilibria in Piecewise Deterministic Games via Stochastic Programming Methods, *Annals of the International Society of Dynamic Games* , Vol. 6, 2002.
47. Filar J.A. and Haurie A., A two factor stochastic production model with two time scales, *Automatica* , Vol. 37, pp. 1505-1513, 2001.
48. Filar J.A., Gaitsgory V. and Haurie A., Control of Singularly Perturbed Hybrid Stochastic Systems, *IEEE Transactions on Automatic Control*, *IEEE Transactions on Automatic Control*, vol. 46, no. 2, 179-190, 2001.
49. Altman E., Haurie A., Moresino F. and Pourtallier O., ``Approximating Equilibria in Nonzero-sum Games'', *International Game Theory Review*, Vol. 2, Nos 2 & 3, pp. 155-172, 2000.
50. Haurie A. and F. Moresino, A stochastic programming approach to manufacturing flow control, *IEE Transactions*, Vol. 32, pp. 907-919, 2000.
51. Carlson D. and Haurie A., Infinite horizon dynamic games with coupled state constraints , pp. 195-212, in J.A. Filar and V. Gaitsgory and K. Mizukami eds., *Advances in Dynamic Games and Applications*, *Annals of the International Society of Dynamic Games*, Birkhäuser, 2000.

52. Haurie A., Moresino F. and Pourtallier O. , Oligopolies as Dynamic Games: A computational economics perspective, in P. Kall and H.-J. Luethi eds. *Operations Research - Ongoing Progress Proceedings of OR 98*, International Conference on Operations Research, ETH Zurich, 31 August - 3 September 1998.
53. Fedra K. and Haurie A., A decision support system for air quality management combining GIS and Optimization techniques, in Fragnière E. (ed), "Applications of Decision Analysis to Environmental Problems", Special Issue of *Int. J. of Environment and Pollution*, Vol.12, No. 2/3, pp.125-146,1999.
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55. Fragnière E., Haurie A. and Kanala R., A GIS-Based Energy-Environment Policy Model , *Int. J. of Global Energy Issues*, Vol. 12, pp.1-6, 1999.
56. Bahn O., Haurie A., Kypreos S. and Vial J.-P. , Advanced mathematical programming modeling to assess the benefits of international CO2 abatement cooperation, *Environmental Modeling and Assessment*, Vol. 3, Nos 1 and 2, pp. 107-116, June 1998.
57. Bakonyi M., Chapuy S., Courvoisier O., Degli Agosti R., Deriaz B., Dimcovski Z., Din A., Dubois A.,Haurie A. ,Kanala R. ,Polla B. , Thudium J., AIDAIR-Genève: L'interdisciplinarité mise en oeuvre pour la gestion de la qualité de l'air, *Cahiers du CUEH*, No 1, Université de Genève, pp. 1-17, 1998.
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59. Haurie A. and Krawczyk J., Optimum charges on river effluent from lumped and distributed sources, *Environmental Modeling and Assessment*, Vol. 2, No 3, pp. 177-190, October 1997.
60. Haurie A. and Loulou R., Modeling Equilibrium and Risk under Global Environmental Constraints in Energy Models in W.A Martin and B. Tolwinski eds, *Modeling Environmental Policy*, Kluwer academic publishers, Amsterdam, 1997.
61. Fedra K., Greppin H., Haurie A., Hussy Ch., Hy Dao, Kanala R. and Degli Agosti R., GENIE: an integrated environmental information and decision support system for Geneva. Part 1: Air Quality, *Achs Sci. Genève*, Vol. 49, Fasc. 3, pp. 247-263, Dec. 1996.
62. Filar J.A. and Haurie A., Optimal ergodic control of singularly perturbed hybrid stochastic systems, in G.G. Yin and Q. Zhang eds., *Mathematics of Manufacturing Systems, American mathematical Society Lectures in Applied Mathematics*, Vol. 33, 1997, pp.101-126.
63. Fragnière E. and Haurie A., A stochastic programming model for energy/environment choices under uncertainty, *Int. J. Environment and Pollution*, Vol. 6, Nos. 4-6, 1996, pp.587-603.
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65. Carlson D. and Haurie A., A Turnpike Theory for Infinite Horizon Competitive Processes, *SIAM Journal on Optimization and Control* , Vol. 34, No. 4, pp.1405-1419, July 1996.
66. Carlson D. and Haurie A., A Turnpike Theory for Infinite Horizon Open-Loop Differential Games with Decoupled Dynamics}, in G.J. Olsder ed., "New Trends in Dynamic Games and Applications, *Annals of the International Society of Dynamic Games*, Vol.3 pp. 353-376, 1996.
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74. Haurie A., Krawczyk J.B. and Roche M. , Monitoring Cooperative Equilibria in a Stochastic Differential Game, *Journal of Optimization Theory and Applications*, Vol. 81, pp. 73-95,1994.

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#### Conferences

Alain Haurie has participated in many conferences. He has been on the organizing committee of several international scientific meetings concerning in particular game theory and energy/environment modeling.