



Keith, David

Professor, Department of Chemical and Petroleum Engineering

Selected Publications (2008-2011)

- Moreno-Cruz J., Ricke K. and Keith D.W, (2011). A simple model to account for regional inequalities in the effectiveness of solar radiation management. *Climatic Change*. (PDF)
- Keith D. (2011). Reshaping the energy landscape. *Physics Today*, 64: 56-57. (PDF)
- Keith D., Moreno-Cruz J., (2011). Pitfalls of coal peak production. *Nature*, 469: 472. (PDF)
- Cubi E. and Keith D.W. (2011). LEED, Energy Savings, and Carbon Abatement: Related but Not Synonymous. *Environmental Science and Technology*, 45: 1757-1758. (PDF)
- Yeh, S., S. M. Jordaan, Keith D.W., et al. (2010). "Land Use Greenhouse Gas Emissions from Conventional Oil Production and Oil Sands." *Environmental Science & Technology* 44(22): 8766-8772.
- Dai J., Singh A., Heidel K., Keith D.W., 2010. Process Simulation of Direct CO₂ Capture from Air: Mass and Energy Balance, Unit Operations. GHGT-10 Posters - Amsterdam, The Netherlands, September 21 (PDF).
- Caldeira K. and D. W. Keith. (2010). The Need for Climate Engineering Research. *Issues in Science and Technology*. 27: 57-62. (PDF)
- Ghaderi S., David Keith, Rob Lavoie and Yuri Leonenko, (2010). Evolution of Hydrogen Sulfide in Sour Saline Aquifers During Carbon Dioxide Sequestration. *International Journal of Greenhouse Gas Control*, 5: 347-355. (PDF)
- Pierce J.R., Weisenstein D.K., Heckendorn P., Peter T. and Keith D.W. (2010). Efficient formation of stratospheric aerosol for geoengineering by emission of condensible vapor from aircraft. *Geophysical Research Letters*, 37, L18805, doi: 10.1029/2010GL043975. (PDF) (Aux Material)
- Bergerson J. and Keith D.W., (2010). The truth about dirty oil: Is CCS the answer? *Environmental Science & Technology*, 44 (16): 6010-6015. (PDF)
- Kirsten Zickfeld, M. Granger Morgan, David J. Frame and David W. Keith. (2010). Expert judgments about transient climate response to alternative future trajectories of radiative forcing. *PNAS*, 107: 12451-12456. (PDF)



Keith, David

Professor, Department of Chemical and Petroleum Engineering

Selected Publications (2008-2011)

- John Shepherd, Ken Caldeira, Joanna Haigh, David Keith, Brian Launder, Georgina Mace, Gordon MacKerron, John Pyle, Steve Rayner, Catherine Redgwell, Peter Cox and Andrew Watson (2009). *Geoengineering the climate - Science, governance and uncertainty*. The Royal Society. (PDF)
- Blackstock J.J., Battisti D.S., Caldeira D., Eardley D.M., Katz J. I., Keith D. W., Patrinos A. A. N., Schrag D. P., Socolow R. H. and Koonin S. E. (2009). *Climate Engineering Responses to Climate Emergencies*, Novim. (PDF)
- Keith D.W., (2009). Why Capture CO₂ From The Atmosphere. *Science*, 325: 1654-1655. [Abstract] [Full Text]
- David W Keith, Kenton Heidel and Robert Cherry. Capturing CO₂ from the atmosphere: Rationale and Process Design Considerations. *Geo-Engineering Climate Change: Environmental necessity or Pandora's box?*. B. Launder and M. Thompson ed, Cambridge University Press, p. 107-126. (PDF)
- Mahmoudkhani M., Heidel K.R., Ferreira J.C., Keith D.W. and Cherry R.S. (2009). Low energy packed tower and caustic recovery for direct capture of CO₂ from air. *Energy Procedia*, 1: 1535-1542. (PDF)
- Mahmoudkhani M. and Keith D.W., (2009). Low-energy sodium hydroxide recovery for CO₂ capture from air. *International Journal of Greenhouse Gas Control Technologies*, 3: 376-384. (PDF)
- Sharp J.D., Jaccard M.K. and Keith D.W., (2009). Anticipating Public Attitudes toward Underground CO₂ Storage. *International Journal of Greenhouse Gas Control Technologies*, 3: 641-651. (PDF)
- Zeidouni M., Pooladi-Darvish M. and Keith D.W., (2009). Analytical Solution to Evaluate Salt Precipitation during CO₂ Injection in Saline Aquifers. *International Journal of Greenhouse Gas Control Technologies*, 3: 600-611. (PDF)
- Hassanzadeh H., Pooladi-Darvish M. and Keith D.W., (2009). Accelerating CO₂ Dissolution in Saline Aquifers for Geological Storage-Mechanistic and Sensitivity Studies. *Energy & Fuels*, 23: 3328-3336. (PDF)
- Rhodes J. and Keith D.W. (2009). Biomass co-utilization with unconventional fossil fuels to advance energy security and climate policy. *National Commission on Energy Policy*.(PDF)



Keith, David

Professor, Department of Chemical and Petroleum Engineering

Selected Publications (2008-2011)

- Keith, D.W. (2009). Dangerous Abundance. IN: Homer-Dixon, T. & Garrison, N. (Eds.) *Carbon Shift: How The Twin Crises Of Oil Depletion And Climate Change Will Define The Future*, Toronto: Random House of Canada, pp26-57. (PDF)
- Jordaan S.M., Keith D.W. and Stelfox B., (2009). Quantifying land use of oil sands production: a life cycle perspective. *Environmental Research Letters*, 4. (PDF)
- Cubi E., David Keith and Jim Love. (2009). Performance challenges of UFAD. *American Society of Heating, Refrigerating and Air-Conditioning Engineers*, 51. (PDF)
- Curtright A.E., M. Granger Morgan and David W. Keith. (2008). Expert Assessments of Future Photovoltaic Technologies. *Environmental Science & Technology*, 42: 9031-9039. (PDF)
- Granger Morgan and David W. Keith. (2008). Improving the way we think about projecting future energy use and emissions of carbon dioxide. *Climatic Change*, 90: 189-215. (PDF)
- Kirk-Davidoff D.B. and David W. Keith. On the climate impact of surface roughness (2008). *Journal of Atmospheric Sciences*, 65: 2215-2243. (PDF)
- Stephens, J. C. and D. W. Keith (2008). Assessing Geochemical Carbon Management. *Climatic Change*, 90: 217-242. (PDF)
- Wilson E.J., Morgan M.G., Apt J., Bonner M., Bunting C., De Figueiredo M.A., Gode J., Jaeger C.C., Keith D.W., McCoy S.T., Haszeldine R.S., Pollak M.F., Reiner D.M., Rubin E.S., Torvanger A., Ulardic C., Vajjhala S.P., Victor D.G. and Wright I.W., (2008). Regulating the Geological Sequestration of Carbon Dioxide. *Environmental Science & Technology*, 42: 2718-2722.(PDF)
- Rhodes J.S. and Keith D.W., (2008). Biomass with Capture: Negative Emissions Within social and Environmental Constraints. *Climatic Change*, 87: 321-328. (PDF)
- Leonenko, Y. and Keith D.W., (2008). Reservoir engineering to accelerate the dissolution of CO₂ stored in aquifers. *Environmental Science & Technology*, 42: 2742-2747. (PDF)
- Zeman F.S. and Keith D.W., (2008). Carbon Neutral Hydrocarbons. *Philosophical Transactions of the Royal Society (A)*, 366: 3901-3918. (PDF)
- Stolaroff J.K., Keith D.W. and Lowry G.L., (2008). Carbon dioxide capture from atmospheric air using sodium hydroxide spray. *Environmental Science & Technology*, 42: 2728-2735. (PDF)



Keith, David

Professor, Department of Chemical and Petroleum Engineering

Selected Publications (2008-2011)

Cheryl Slusarchuk, Shawn Atleo, Donna Barnett, Jeff Burghardt, Lyn Brown, Randy McLeod, Joe Van Belleghem, Teresa Coady, Ian Tostenson, Andrew Weaver, John Robinson, Naomi Devine, Peter Robinson, David Keith, John Walker and Mossadiq Umedaly (2008). *Climate Action Plan*, The Government of British Columbia.

Submitted/Working papers:

McClellan J., Sisco J., Suarez B., Keogh G., Keith D.W. and Apt J., Cost analysis of stratospheric albedo modification delivery systems. (PDF)

Safaei Mohamadabadi H., Hugo R. and Keith D.W., Enhancing the economics of wind-based compressed air energy storage by waste heat recovery. *ASME Energy Sustainability Conference, Washington DC*. (PDF)

Mercer A.M., Keith D.W and Sharp J.D., Public understanding of Solar Radiation Management. *Environmental Research Letters*. (PDF) [Plain Language Communications Poster - PDF]

Doluweera, S. Jordaan, J. Bergerson, M. Moore and D. Keith. Evaluating the Role of Cogeneration for Carbon Management in Alberta. *Energy Policy*. (PDF)

Holmes G. and Keith D.W., An Air-Liquid Contactor for Large-Scale Capture of CO₂ from Air. *Philosophical Transactions of the Royal Society A – Mathematical, Physical & Engineering Sciences*.

MacMynowski D.G., Shin H.G., Caldeira K. and Keith D.W., Can we test geoengineering? *Energy and Environmental Science*. (PDF)

Moreno-Cruz J.B. and Keith D.W., Climate Policy under Uncertainty: A Case for Geoengineering. *Climatic Change*. (PDF)

Juan B Moreno-Cruz and David W Keith. (under review). Climate Policy under Uncertainty: A Case for Geoengineering. *Climatic Change*. (PDF)

Jeffrey R. Pierce, Debra K. Weisenstein, Patricia Heckendorn, Thomas Peter and David W. Keith. (in press). Efficient formation of stratospheric aerosol for geoengineering by emission of condensable vapor from aircraft. *Geophysical Research Letters*. (PDF)



Keith, David

Professor, Department of Chemical and Petroleum Engineering

Selected Publications (2008-2011)

Doluweera G., Jordaan S., Bergerson J., Moore M., and Keith D., "Evaluating the Role of Cogeneration for Carbon Management in Alberta". Submitted to Energy Policy.

Doluweera G. and Keith D.W., "Assessing the Effectiveness of Wind Power for Carbon Management of Electric Power Systems" In preparation.

Report:

Aurora Flight Sciences report on Geoengineering Cost Analysis (PDF). Note: This report was commissioned by the University of Calgary as a contract to Aurora. The project was managed by Jay Apt at Carnegie Mellon and David Keith. The report benefited from reviews and input by various experts in aerospace and atmospheric science. Jay Apt managed Aurora's response to review.