

# The L.A. Colding Lecture Series

## in Environmental Science and Technology

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### Are Ethanol Fuels Really “Green”? A Hydrogeologist’s Perspective

June 24th, 2008, 15:00

Building 113, Room 011

**Abstract:**

North America is following Brazil by introducing gasoline with 10% to 85% ethanol (E10, E85). Various cost-benefit and partial life cycle analyses have considered the use of ethanol in transportation fuel and this remains a fruitful research area. Ethanol derived from sugar cane or waste cellulose appears to be more sustainable than ethanol derived from corn. Unfortunately corn is currently the dominant feedstock in North America. This is causing a variety of dislocations, including declining production of hops and so increased cost of local beer. It is evident that complex socio-economic issues are driving the use of ethanol as a gasoline additive in North America.

Ethanol in gasoline is an issue even for hydrogeologists. While ethanol itself is not a chemical of concern, its use and leakage into the subsurface poses additional risk. Current subsurface concerns focus on the implications for fate, transport, and monitoring of the buoyancy of ethanol-water solutions, the explosive risk as ethanol is fermented to methane, and the potential for ethanol to lead to greater persistence of gasoline hydrocarbons, specifically monoaromatics such as benzene, in groundwater. For example, the use of ethanol in gasoline may challenge risk management using monitored natural attenuation (MNA). Ethanol may be transported in the capillary fringe and so will pose a challenge for monitoring. An initial “slug” of ethanol-benzene-rich groundwater may persist for significantly greater distances in groundwater. Research in the shallow, sand research aquifer at CFB Borden continues to address these concerns. However, it is clear that our concerns will not influence society’s choice of what goes into gasoline.



Ludvig August Colding was Copenhagen’s city engineer in the period 1857-1886 and designed the city’s water supply system. He chose to base the supply entirely on groundwater. The system’s general layout and many of its details date back to Colding’s era. From 1869-1886, Colding was a professor at the Technical University of Denmark. At the age of 26, he discovered the law of conservation of energy, simultaneously with, but independently of Joule.