

# SEMINAR

Monday, February 4, 2019, 4:10 – 5:00 pm  
Bonderson 1<sup>st</sup> floor club room (Bldg. 197, Rm 104)

## Dream Machines: Zero CO<sub>2</sub> Emission Fossil Power Plants

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Fossil fuel power plants must implement technologies that eliminate CO<sub>2</sub> emissions. Existing fossil, mainly coal-fired, power plants can use 'carbon capture and sequestration' (CCS) technologies that capture CO<sub>2</sub> from the flue gases using amine or similar absorbers, and then injecting it underground for permanent disposal. An example is "Boundary Dam " Power Plant (Saskatchewan, Canada) where \$1.5 billion has been spent to capture CO<sub>2</sub> from about 1/3 of the exhaust flue gas and then pump it (as liquid CO<sub>2</sub>, at 200 bar) about 1 km underground. Although technologically successful, it was projected to cost several hundred dollars per ton of CO<sub>2</sub> mitigated. Lower cost technologies are needed.

Another option, already studied for many years, is the use of pure O<sub>2</sub> in an 'oxyfuel' combustion process, resulting in an essentially pure CO<sub>2</sub> flue gas. The CO<sub>2</sub> can be partially recycled, serving as diluent or moderator, in the so-called "Allam Cycle", after Rodney Allam, CTO of "Net Power". A pilot plant started operations last year at a natural gas power plant in La Porte, Texas, promising zero cost, with the \$50 of CO<sub>2</sub> tax credits enacted in the 2018 Tax Law.

A novel, patented (by Prof. Dibble) oxyfuel technology uses Argon, rather than CO<sub>2</sub>, as moderator in the combustion process. The advantages of monoatomic Argon in this process, being developed by Nobel Thermodynamics, Inc., will be discussed.

**Short Bio:** Bob Dibble, a graduate Chemical Engineer (B.S. UC Berkeley, Ph.D. U. Wisconsin), Post Doc at Imperial College London, then joined the Combustion Research Facility at Sandia National Laboratories. He was a faculty member of the Mechanical Engineering Department at UC Berkeley from 1990 to 2014, and is now at the Clean Combustion Research Center of KAUST on the Red Sea, Saudi Arabia.

**NOTE: KAUST, a leading international university, offers full scholarships to students interested in pursuing a Ph.D. in a western-style campus - <https://kaust.edu.sa/en>**