Interactions with Industry

- Ed Law spoke to me about his goal of creating a strong connection between CEFRC and industry
- Asked me to suggest some ways that might be done
- Long history of DOE/Lab/University/Industry teams
- Princeton was where it all began in middle 1970s
- DISC, Lean Burn, Engine Knock, HCCI, Diesel, etc.
General benefits

- Get students and post-docs working with companies, perhaps leading to jobs
- Involve companies by getting their research priorities identified
- Where possible, work on such priority tasks
- Higher level goal, get industry researchers to visit CEFRC for seminars, engage in research activities side-by-side with university researchers, short- and long-term
- High value results will appeal to DOE
Two examples of how some partnerships work
### Companies which contribute (financially) to the research, time period and interest

- **Rolls-Royce** 2000-now  
  FGM in combustion modeling
- **Gasunie Research** 1988-now  
  natural gas/syngas flames
- **Gastec NV** 1988-2000  
  combustion in central heaters
- **EnergieNed** 1998-2000  
  combustion in central heaters
- **TNO** 1996-now  
  engines, acoustics
- **Philips NV** 2000-now  
  heat transfer of flames to glass
- **ATAG** 1997-2006  
  noise in boilers
- **AWB** 1997-now  
  noise in boilers
- **Remeha BV** 1997-now  
  noise in boilers
- **Bekaert Techn** 2001-now  
  noise in boilers
- **Noritz** 2008-now  
  noise in boilers
- **Honeywell** 2001-now  
  control of noise in boilers
- **Polidoro NV** 2006-now  
  combustion/noise in burners
- **EcoCeramics BV** 1996-now  
  surface burners
- **ECN** 1992-now  
  surface burners/biomass
- **DAF trucks** 1996-now  
  diesel combustion
- **Shell** 1996-now  
  fuels in engines
- **Avantium** 2008-now  
  future fuels
<table>
<thead>
<tr>
<th>Company</th>
<th>Years</th>
<th>Field</th>
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<tr>
<td>Warsila</td>
<td>1996-now</td>
<td>diesel combustion</td>
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<td>Chevron-Oronite</td>
<td>1996-now</td>
<td>fuels in engines</td>
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<td>PD&amp;E</td>
<td>1996-now</td>
<td>engine combustion</td>
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<td>Kema NV</td>
<td>2008-now</td>
<td>biomass combustion</td>
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<td>Essent</td>
<td>2007-2008</td>
<td>biomass combustion</td>
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<tr>
<td>Electrabel</td>
<td>2001-now</td>
<td>biogas addition in gas turbines</td>
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<td>Laborolec</td>
<td>2003-now</td>
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<td>Siemens</td>
<td>2008-now</td>
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<td>Thomassen/Ansaldo</td>
<td>2008-now</td>
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<td>NVV</td>
<td>2008-now</td>
<td>Clean Combustion Concepts</td>
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<td>Renuda</td>
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<td>MTT</td>
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<td>combustion in micro-turbines</td>
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<td>Bosch-Nefit</td>
<td>2009-now</td>
<td>laminar flames in boilers</td>
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<td>Fistuca</td>
<td>2008-now</td>
<td>spin off, innovations</td>
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<tr>
<td>Progression Industry</td>
<td>2009-now</td>
<td>spin off, innovations</td>
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Related goals of the Combustion Institute

- Build on the new CI web pages
- Build a combustion industry family of pages, with the companies identifying their needs and interests, as well as contact people at their companies
Concrete actions for CEFRC

- Invite industry contacts to visit, tour facilities, meet students

- Organize an “open house” for multiple visitors, with a technical highlight program

- Don’t ask for money, just encourage mutual visits and then company participation in ongoing research activities

- Build a network of involved partners, find common technical ground