



UNIVERSITY OF  
**REGINA**

# Impact on Research Capacity

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# Key Infrastructure



Greenhouse Gas  
Technology Centre

International Test Centre  
for CO<sub>2</sub> Capture

Energy Informatics Lab

Geofluids Lab

Petroleum Technology  
Research Centre



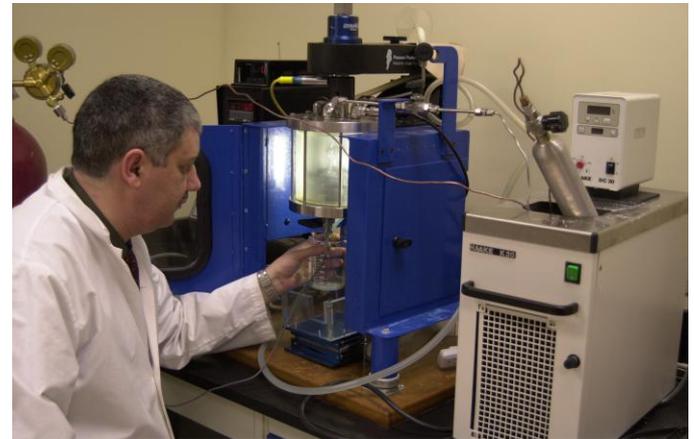
# ITC

- \$5.2M pilot plant at Boundary Dam Power Plant.
- In-house facilities include \$3.3M pilot plant.
- State-of-the-art monitoring and data acquisition are integrated in both locations.
- \$1.2M fundamental and bench-scale equipment, largely furnished with CFI funding.



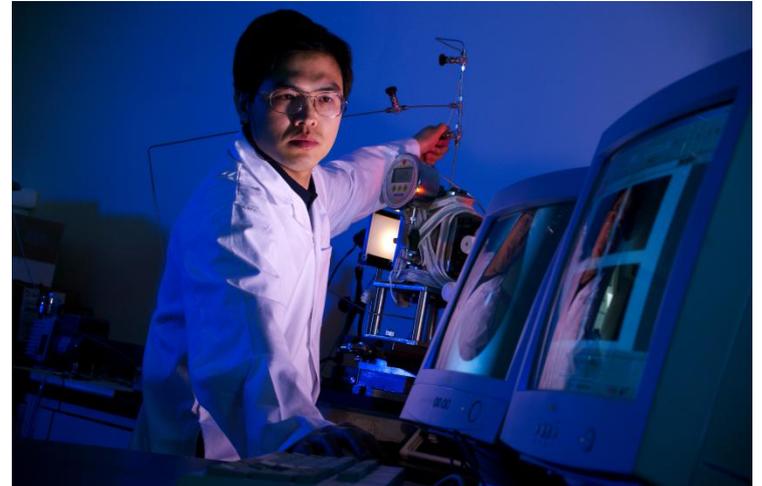
# GHGTC

- \$25 million dollar building that houses ITC & hydrogen production and biofuels research programs.
- This facility will also house two multi-million dollar hydrogen production pilot plants, which are under construction.
- GGTC offers 12,213 square feet of laboratory/research space and 2,586 sq. ft. of office and meeting space.



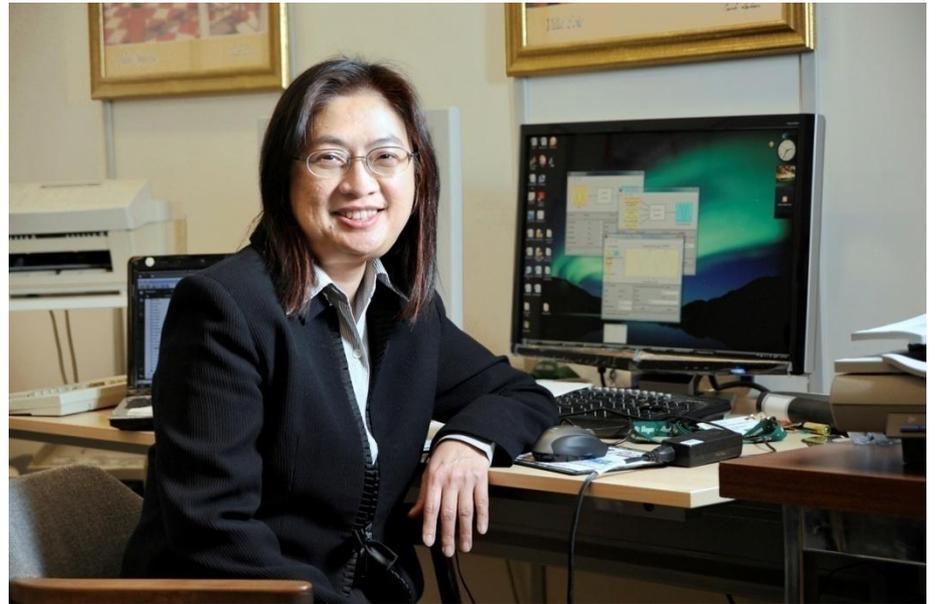
# PTRC

- The U of R leases 5,390 of research/lab space and 4,543 sq. ft. of office space in the PTRC building for the Petroleum Systems Engineering faculty and graduate students.
- Includes space for all of the petroleum-related CFI-funded projects.



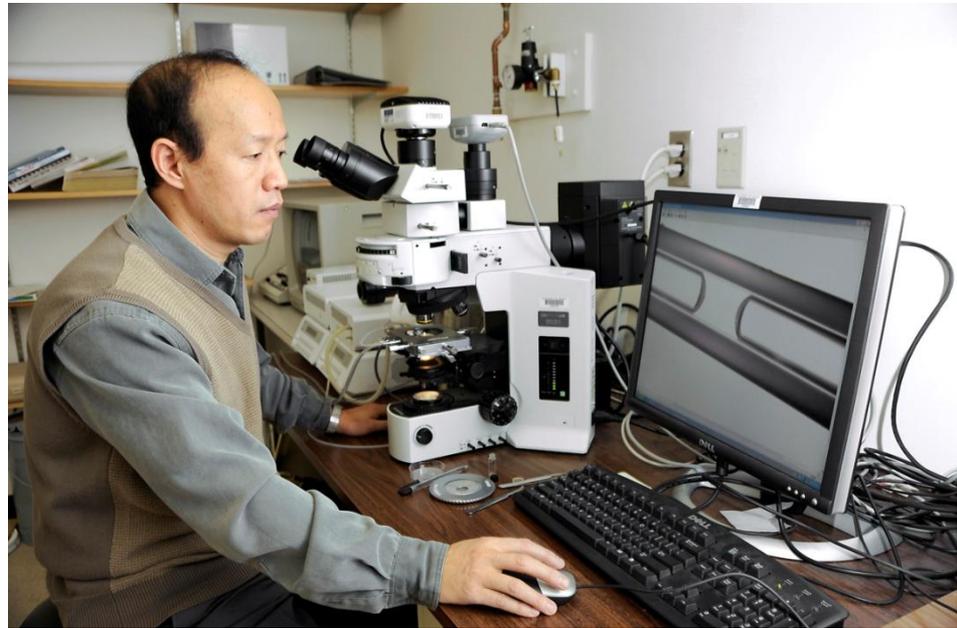
# Energy Informatics Lab

- PL is Dr. Christine Chan  
CRC Tier 1
- Collaborates with other groups to develop Artificial Intelligence and Knowledge-based Systems for operation and optimization of energy-related technologies such as CO<sub>2</sub> capture systems.



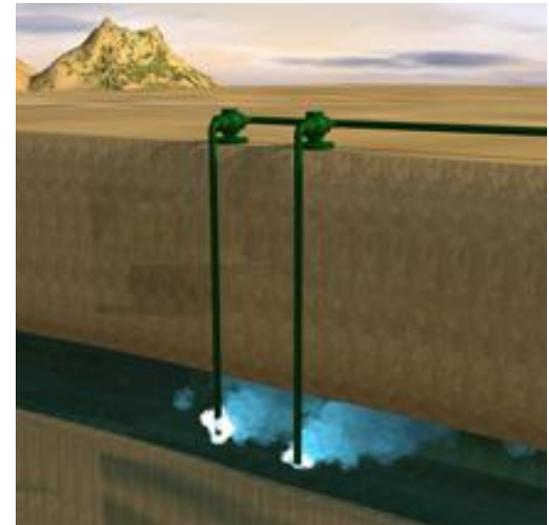
# Geofluids Lab

- PL is Dr. Guoxiang Chi
- Conducts geofluids characterization, materials characterization, and geofluids analysis for CO<sub>2</sub> storage.

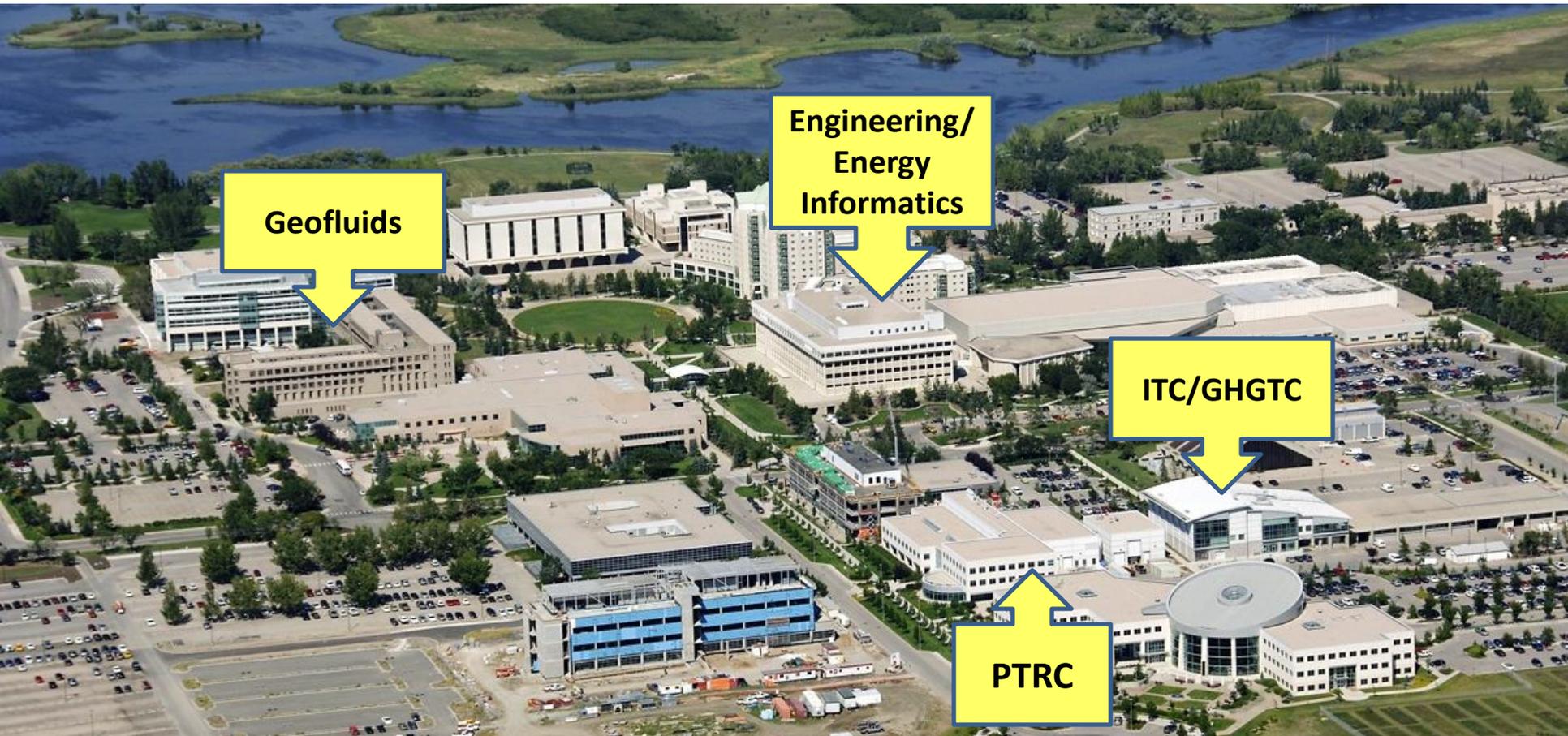


# IPAC-CO<sub>2</sub>

- Announced in 2008
- Major sponsors are Shell and the Government of Saskatchewan at \$5M each
- A collaborative centre for identifying, communicating, and minimizing risks and assessing feasibility of CCS.



# Infrastructure Locations



**Geofluids**

**Engineering/  
Energy  
Informatics**

**ITC/GHGTC**

**PTRC**

# Previous Infrastructure

Existing infrastructure = result of the substantial contributions of CFI and other funding partners.

Prior to 1999:

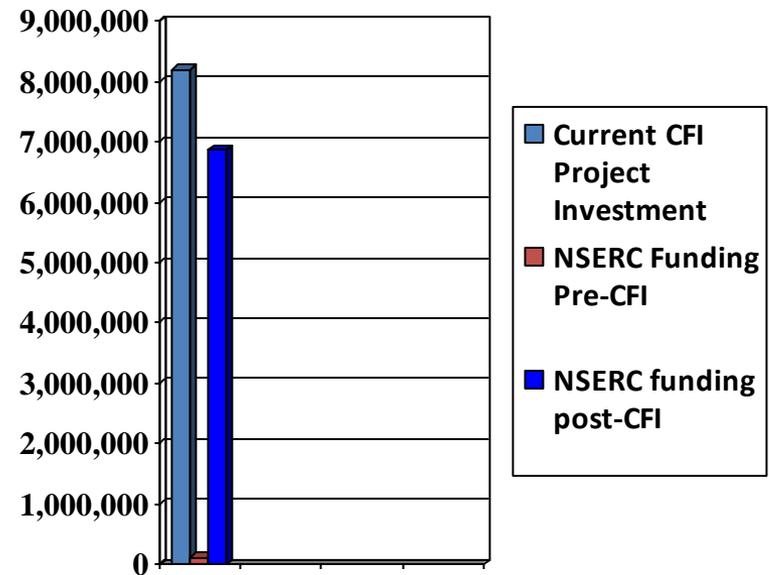
- Very little infrastructure for energy research
- Nominal funding received:

e.g. total value of NSERC equipment grants awarded to PUs of Energy CFI projects was only \$108,042

= 5% of the total investments for infrastructure received from CFI

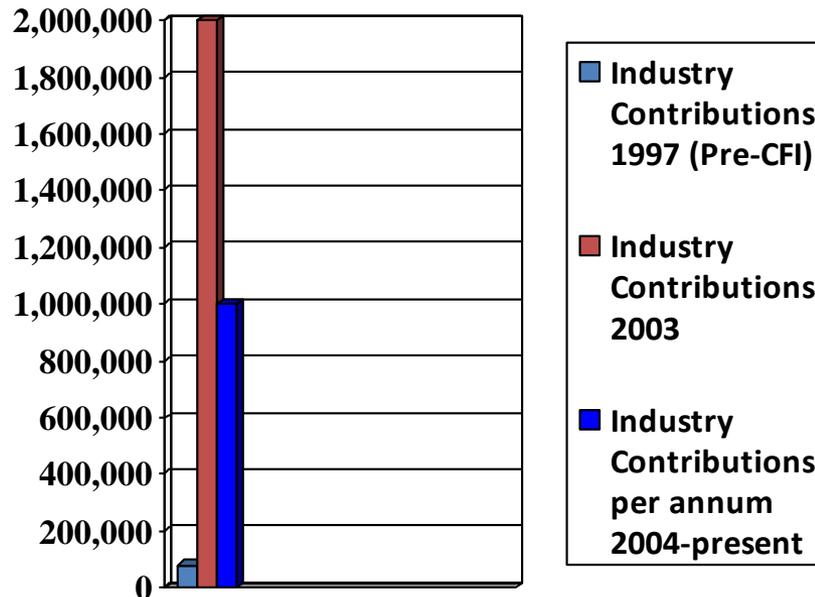
= 2% of total investments when partner contributions are considered.

Current NSERC funding = \$6.8M



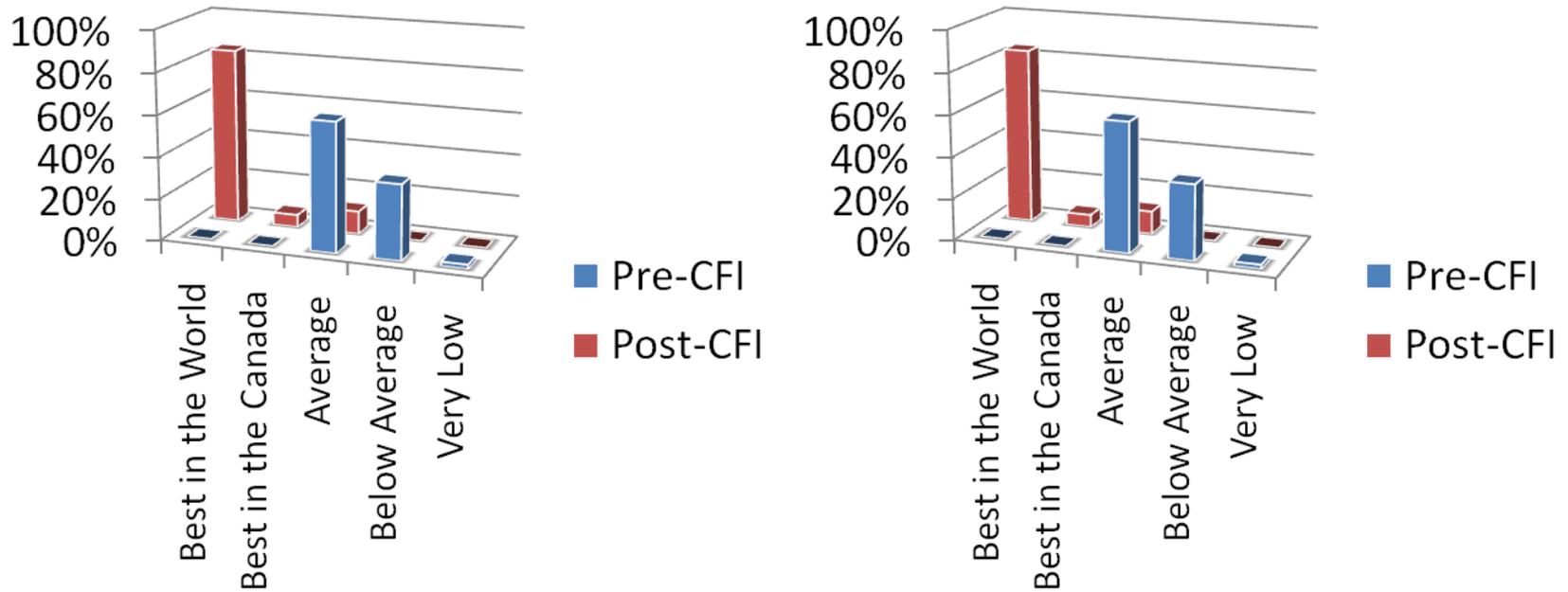
Current total investment in CFI infrastructure vs. NSERC Equipment funding pre-CFI and Post-CFI (as representative of comparative infrastructure funding pre- and post-CFI)

# Industry Contributions



- Some industry contributions predate CFI investments
- Value of contributions increased substantially since CFI
- \$80K contributed in 1997 increased to an annual high of over \$2M in 2003 and over \$1M each year thereafter.

# Technical & Operational Capacity



Source: Interviews with Project Leaders: ratings are based on the 11 CFI projects implemented prior to 2007; the value of the project is based on CFI funding only (excluding IOF).

# Synopsis of pre-CFI equipment

- Before CFI funding:
  - research restricted to fundamental and limited bench-scale in individual laboratory workspace.
  - Little to no state-of-the-art equipment and little to no commercialization capacity.
- Key Infrastructure (GHGTC, ITC, PTRC, etc. did not exist).

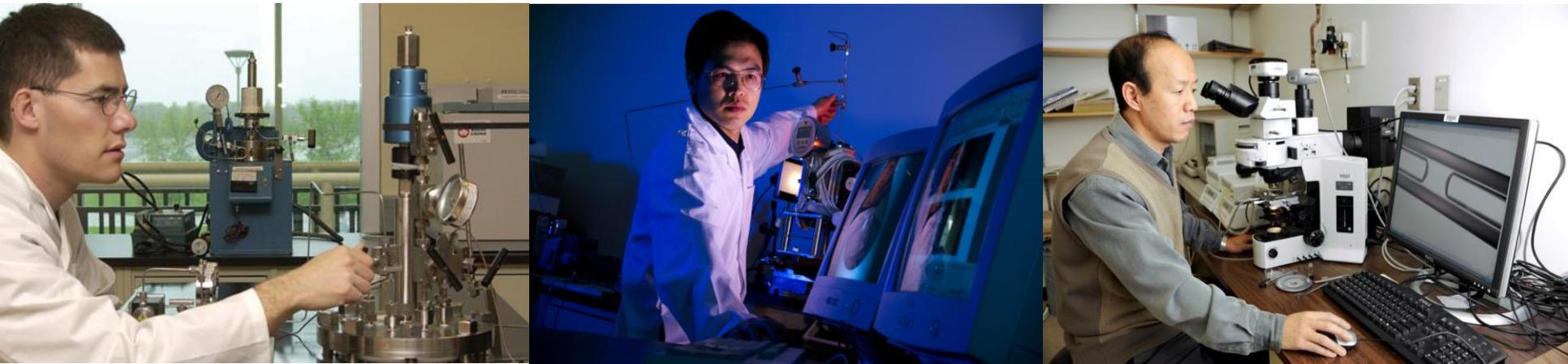
# Critical Mass

- Critical Mass in Energy requires the following areas of expertise:
  - Sustainable oil and gas production
    - PTRC, Energy Informatics, Geofluids
  - Clean Coal or Coal alternatives
    - ITC, Energy Informatics
  - Alternative energy – at least some expertise in:
    - Solar, wind, nuclear, biofuels, biomass
      - GHGTC, Faculty of Engineering and Applied Science



# Infrastructure Quality

- “Best in Canada” or “Best in the World” in critical areas of expertise:
  - CFI provided this in carbon capture, CO<sub>2</sub> storage, enhanced oil recovery, energy informatics



# Demonstration and Commercialization Capacity

- Pilot plants, industry commercialization partners, patents, IP licensing

Pilot demo capture plant – ITC

Pre-commercial capture plant – Boundary Dam

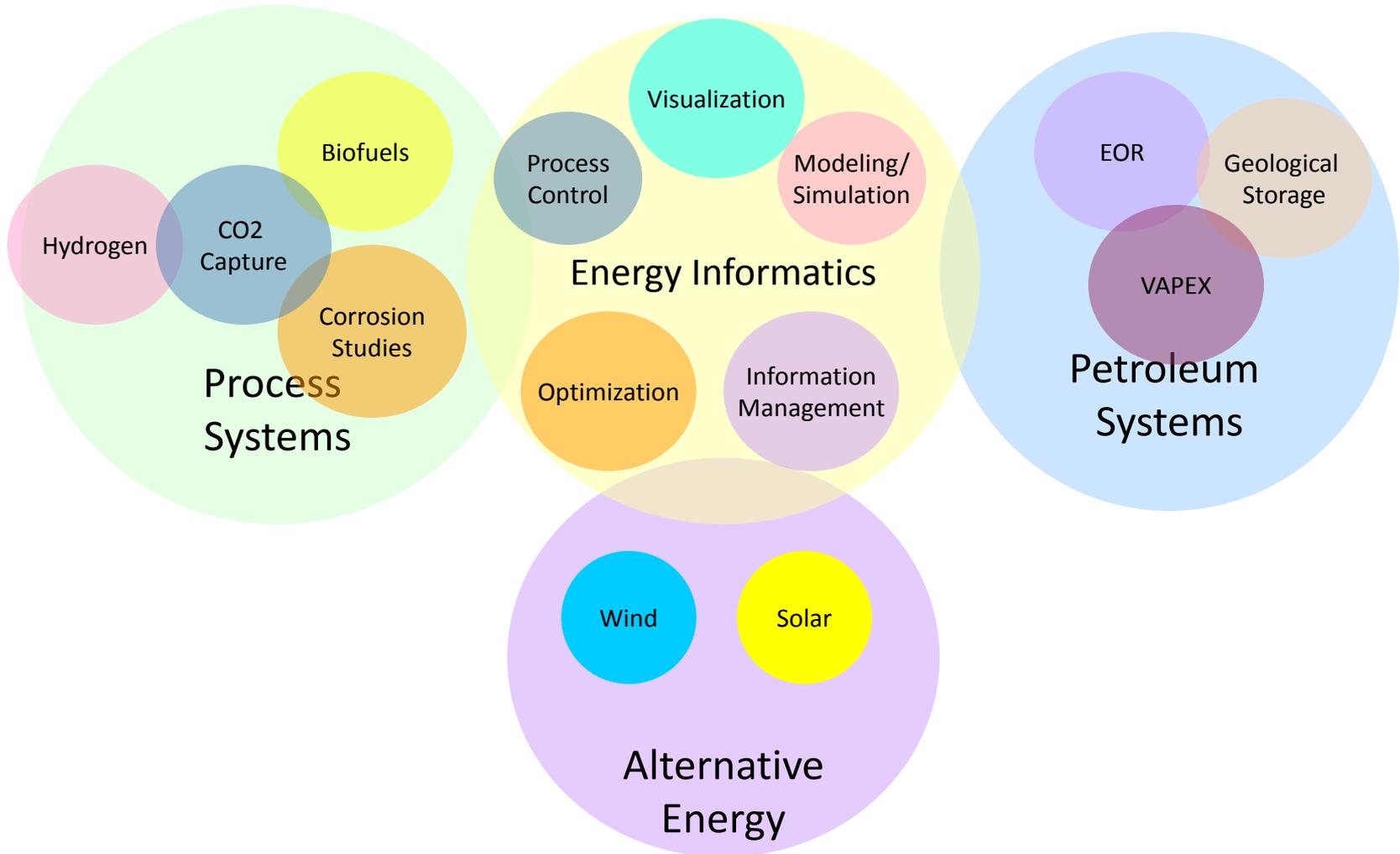
Pilot Hydrogen Production demo plant – ITC

CCS Pureenergy 1000 – HTC Pureenergy & ITC

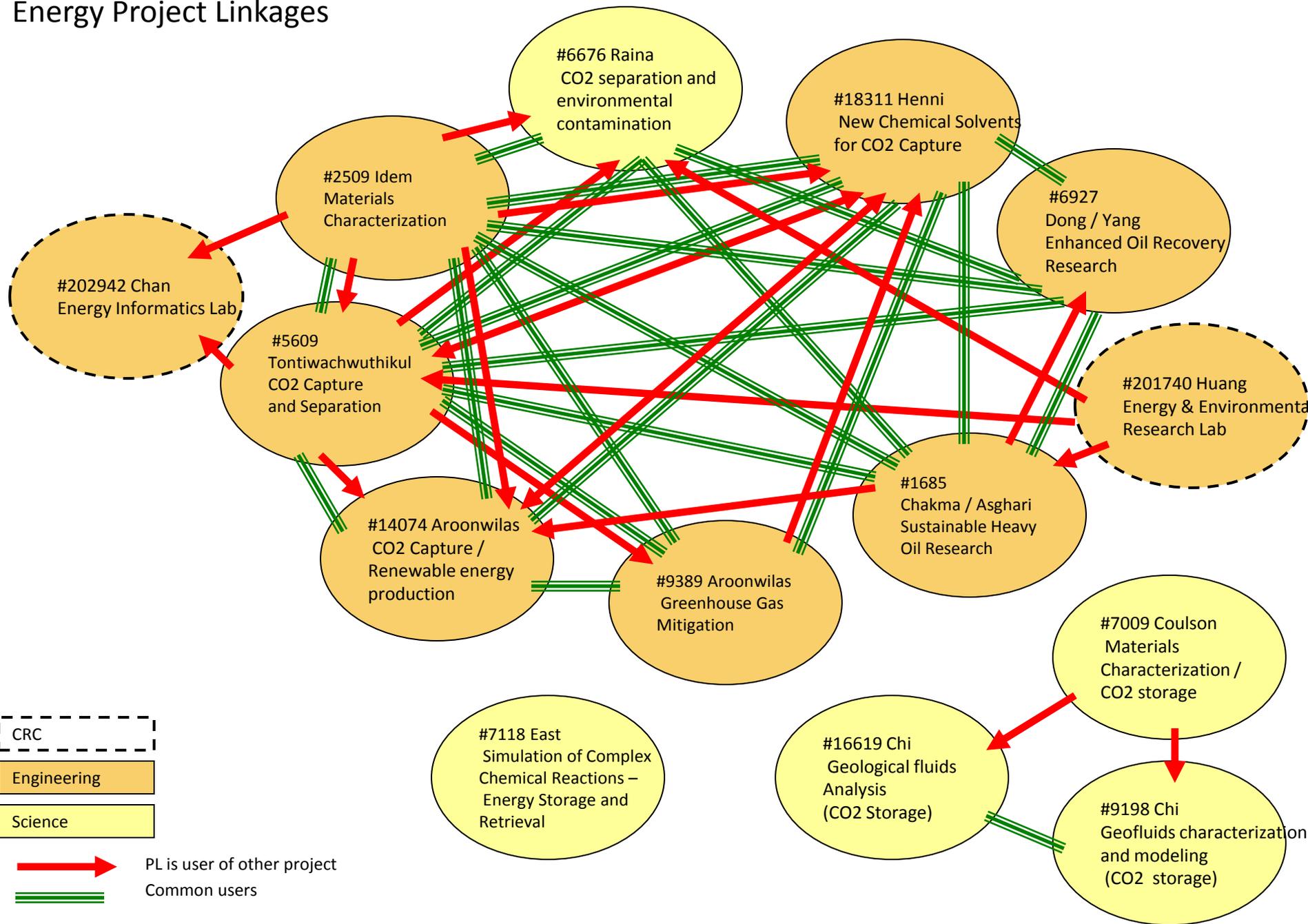
Commercial EOR and pre-commercial CO<sub>2</sub> storage – PTRC



# Multidisciplinarity



# Energy Project Linkages



# Conclusions

## Symbiosis:

- Other major sources of funding, largely government, provided the Key Infrastructure space (i.e. the buildings) while CFI provided vastly improved equipment to furnish the space and support these major initiatives.

# Capacity

- The CFI equipment significantly broadened researcher capacity to engage in cutting-edge, multidisciplinary research
- This has enabled us increase faculty and researcher numbers and to attract:
  - Significantly more funding from NSERC and industry
  - Top graduate students
  - Highly qualified faculty

# Results

- Critical mass in energy
- Commercial technologies



Thank you!