

# CanmetENERGY

*Leadership in ecoInnovation*

## Metallurgical Fuels

Natural Resources Canada's Metallurgical Fuels Laboratory at CanmetENERGY-Ottawa (CE-O) studies and develops technologies to:

- Improve the coking behaviour of coals to produce high-quality coke for safe and efficient industrial operations
- Enhance coal properties for carbonization
- Use coke and alternative fuels including biofuels in blast furnaces and other metallurgical processes to reduce greenhouse gases (GHG)
- Demonstrate the advantages of Canadian coals to world markets

### RESEARCH ACTIVITIES

*Major areas of research:*

- GHG mitigation in the steel industry
- Study of unique coking characteristics of western Canadian coals
- New technologies to enhance coking properties and expand Canada's metallurgical coal resources
- The coking process in conventional slot-type and energy recovery ovens
- The behaviour of coke (degree of stabilization, degradation and permeability) in blast furnaces
- The injection of fossil fuels and alternative fuels including biomass in blast furnaces and gasifiers

### R&D FACILITIES

CE-O's metallurgical fuels facilities include pilot-scale coal handling facilities, coke ovens and coke testing facilities, a high-temperature smelting and laboratory coal and coke evaluation equipment. Most recently, a pilot-scale energy recovery coke oven has been added to the suite of CE-O pilot ovens.



**New 1-tonne capacity Energy Recovery Coke Oven**

#### **Coking Ovens:**

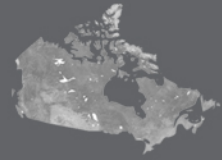
- Two 460mm wide/350kg capacity
- One 150mm wide/15kg capacity
- Energy Recovery Coke Oven, horizontal-type, 1-tonne capacity
- Three ASTM sole-heated ovens/12kg capacity

#### **Coal Preparation:**

- Complete pilot plant handling, blending, crushing, pulverization and sampling
- Briquetting and agglomeration

#### **Coal Evaluation:**

- Microscopic/petrographic analysis
- Thermal rheological analysis
- Expansion/contraction properties via the sole-heated oven
- Bench-scale evaluation of PCI coals and other injectants including biomaterials
- Particle size distribution
- Proximate, ultimate and ash analyses
- Standard ASTM and ISO methods



# CanmetENERGY

*Leadership in ecoInnovation*

## **Coke Evaluation:**

- Size distribution
- Standard ASTM, ISO (MICUM, IRSID) and JIS coke strength evaluations
- Coke stabilization
- Coke bed permeability
- Image analysis for coke size and shape evaluation
- Hot coke strength (CSR) and coke reactivity (CRI)
- Small-scale evaluation of CSR using the sole-heated oven
- SEM/EDX
- Coke microscopy (texture) analysis
- Porosity and density determination
- Proximate, sulphur and ash analyses



**State of the art coal carbonization research and testing facility**

## **OUR CLIENTS**

CE-O works closely with the Canadian Carbonization Research Association (CCRA). Membership is comprised of the following steelmakers, coal and coke producers:

- |                              |                       |
|------------------------------|-----------------------|
| - ArcelorMittal Dofasco Inc. | - Stelco Steel        |
| - Algoma                     | - SunCoke Energy Inc. |
| - Elkem                      | - Teck Coal Ltd.      |
| - North Coal                 |                       |

CE-O's Metallurgical Fuels Laboratory also collaborates with many other clients from Canada, the USA and other countries to perform coal quality evaluation, coal blend carbonization and PCI work. CE-O's coal evaluation, preparation, agglomeration and carbonization facilities are unique in Canada. They are available to industry on a "fee-for-service" basis for the following:

- To aid coal exploration companies in mine planning, marketing and economic investigations
- To evaluate the quality of coke, coal and other fuels including biofuels for metallurgical purposes
- To work with clients to develop their specific technology solutions with a statement of work, a timeline and a budget

***CanmetENERGY-Ottawa leads the development of energy S&T solutions for the environmental and economic benefit of Canadians.***

## **FOR MORE INFORMATION:**

Dr. Louis Giroux, Research Scientist, Met Fuels  
Tel: (613) 996-7638  
Email: [louis.giroux@canada.ca](mailto:louis.giroux@canada.ca)

Mr. Ka Wing Ng, Research Scientist, Solid Fuels and Bio-Carbon  
Tel: (613) 996-8712  
Email: [kawing.ng@canada.ca](mailto:kawing.ng@canada.ca)

### **CanmetENERGY-Ottawa**

Natural Resources Canada, 1 Haanel Drive  
Ottawa, Ontario, Canada K1A 1M1

<http://www.nrcan.gc.ca/energy/efficiency/industry>