Natural Resources Canada | Ressources naturelles Canada

Clean Growth Program

CanmetENERGY-Devon

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Director General

NATURAL RESOURCES CANADA




Canada

CanmetENERGY in Devon

Mandate: Provide national leadership for the **fossil fuel** portfolio to drive sustainable **energy development** and use, and the mitigation of related **environmental impacts** with particular emphasis on unconventional oil and gas. This includes a team of 105 staff spread across the following teams:

Science & Policy Integration

- Coordination on Key Government Priorities: PCF, B2017
- Strategic Partnerships Management: COSIA, CAPP, PTAC
- Stakeholder Engagement: Internal/External

Director: Maria-Ines Maita

Hydrocarbon Recovery
Director: Yanne Messi

Hydrocarbon Conversion
Director: Jinwen Chen

Environmental Impacts
Director: Kim Kasperski

Operations

- Technical Services: pilot plants, facilities, OH&S
- Functions: planning, finance, HR, contracts

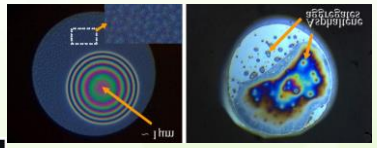
Director: Ben Fotty

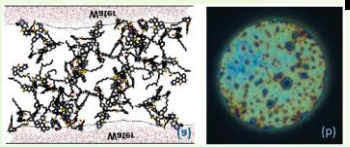
HYDROCARBON CONVERSION RESEARCH

Areas of Focus:

- Partial upgrading
- Upgrading and refining process efficiency
- Future fuels
- Biofuels
- Advanced analytical methods
- Standard analytical methods

HYDROCARBON RECOVERY RESEARCH

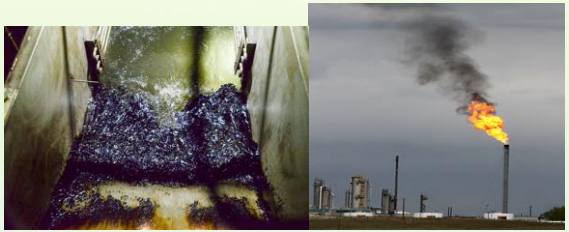




Areas of focus:

- Non aqueous & hybrid (water + solvent) extraction from mined oil sands
- Control of multiphase systems
- Bitumen froth treatment – over $25m in cost recovery in last 10 years
- Advanced modeling and characterization methods
- Carbon Capture, Utilization and Storage

ENVIRONMENTAL IMPACTS RESEARCH



Areas of focus:

- Air emissions reduction: monitoring, detection, quantification and reduction
- Oil spill science: fate, behavior and response
- Land reclamation
- Water quality
- Tailings management

Pilot Plants

- **Spill Tanks**
- **Paraffinic froth treatment process**
  - Tank infrastructure
  - 2-stage separation with a transparent tailings solvent recovery unit
- **Separation Processes**
  - Continuous Distillation
  - Solvent Deasphalter
- **Primary Upgrading**
  - Delayed Coker
  - Residue Hydrocracker
- **Secondary Upgrading**
  - Hydrotreaters/Hydrocrackers
- **Corrosion Unit**
- **Autoclaves**
- Currently vacant
  - Class 1 Zone 2 rated space
  - Electrical and instrumentation infrastructure

Our Pilot Plant/Bench-Scale Testing Capabilities

- Seven (7) fixed-bed hydroprocessing units
  - Once-through, recycle operation with online distillation
  - Single-reactor, two reactors in series
  - Treat gas: 100% H_2, mixtures of $H_2/H_2S/NH_3$
- Slurry hydroconversion unit (Canmet process)
  - Slurry phase tubular reactor, continuous stirred tank reactor
- Coking/visbreaking tubular reactor unit
- Solvent deasphalting unit (ROSE process)
- FCC pilot plant unit (ACE)
- Continuous atmospheric/vacuum distillation unit
- Four (4) autoclave batch reactors for multiple purposes
- Corrosion unit
- Alcor hot liquid process simulator (HLPS) unit

Our Standard and Advanced Characterization Capabilities

- Hydrocarbon properties
  - ✓ Density, viscosity …
- Elemental analysis
  - ✓ C/H/S/N/O, metals (Ni, V, etc.) …
- Chromatography
  - ✓ SimDis
  - ✓ Refinery gas …
- Distillation
  - ✓ Atmospheric ASTM D86
  - ✓ Vacuum ASTM D1160
  - ✓ Spinning band …
- ……

- Chromatography
  - ✓ GC-MS, GC-FIMS, HPLC
  - ✓ Sulfur by GC-SCD
  - ✓ Nitrogen by GC-NCD
- Two-D GC (GCxGC)
  - ✓ GC×GC-FID, GC×GC-TOFMS
  - ✓ Sulfur by GC×GC-SCD
  - ✓ Nitrogen by GC×GC-NCD
- Spectroscopy
  - ✓ ^{13}C and ^{1}H NMR
  - ✓ Raman, Infrared, UV-Vis
- ……