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Summary Overview

• Canada is launching a new regulatory agenda, “Turning the Corner”
  – Focussed on reducing emissions of both GHGs and air pollutants through 2020
• The agenda will be technology-forcing, particularly for electricity and the tar sands
• Transportation measures will improve emissions performance
• Concludes with some observations for emissions research
Canada’s Regulatory Framework for Air Emissions

- On October 21, 2006, the federal government proposed an integrated approach to the regulation of greenhouse gas and air pollutant emissions.
  - Greenhouse gases and air pollutants share many common sources
  - Coordinated approach to allow firms to maximize synergies in reducing their emissions.
  - Stakeholder consultations launched
- On April 26, 2007, the federal government announced *Turning the Corner: An Action Plan to Reduce Greenhouse Gases and Air Pollution* and made public the regulatory framework for air emissions
- The regulatory framework for air emissions presents mandatory and enforceable reductions in emissions of greenhouse gases and air pollutants
Intensive consultations followed release of Framework in April

• Immediately following the release of the regulatory framework, work commenced with provinces and territories, industry sectors, and with non-governmental organizations on:
  – Validation of sector-specific air pollutant targets including their date of coming into force
  – Allocation of air pollutant and implementation of GHG targets within each sector
  – Broad parameters of compliance mechanisms
Next Steps

• Greenhouse Gas Regulatory Framework has been finalized.
  – GHG debate well-advanced (since 1997)
  – Draft regulations to be published for public comment this fall
  – Regulations expected to enter into force January 1, 2010

• Consultations on the air pollutant elements have been extended
  – Air pollution elements to be added to the draft regulations once
    the regulatory framework for air pollutants is finalized (likely
    Spring, 2008)
Turning the Corner: Taking Action to Fight Climate Change
Canada’s GHG emissions have grown steadily since 1990

- At Kyoto, Canada committed to a target of 6% below 1990 levels
  - Canadian emissions have grown steadily and are 25% higher than they were in 1990 (32% above Canada’s Kyoto target)
- Without immediate action, Canadian emissions could increase by another 26% by 2020
Canada is now taking aggressive action to reduce emissions of GHGs

- Government is committed to reduce emissions, relative to 2006, by 20% by 2020
  - 330Mt from BAU
  - Goal is a 60-70 percent reduction by 2050
- Level of effort will be significant due to growing population, growing economy and increasing energy exports.
Canada’s regulatory system will apply to all industries and get tougher over time.

**TOUGH**
For existing facilities in all industrial sectors: mandatory reductions starting in 2010 and becoming tougher every year.

**TOUGHER**
For new plants in key sectors coming on stream in 2004 and later: tougher emission targets to drive adoption of cleaner fuels and technologies.

**TOUGHEST**
For oil sands and coal power plants coming on stream in 2012 and later:
- An end to new dirty coal plants
- Effectively requiring that oil sands use carbon capture and storage or other green technology to drastically cut greenhouse gas emissions.
Canada’s emissions reduction pathway to 2020 will engage all sectors of the economy.

Projected Emissions Reductions to 2020

- Others
- Buildings
- Transportation
- Mining and Manufacturing
- Conventional Oil and Gas
- Oil Sands
- Electricity Generation
- Projected Emissions

20% below 2006
Turning the Corner: Taking Action to Fight Air Pollutants
Air pollutant targets aligned with the best in the world

- Benchmarking to other jurisdictions
  - Examined the most stringent standards for each pollutant in each sector in Canada (provinces), in the U.S., and internationally
  - Where no benchmark exists, targets developed based on specific activities and equipment in similar sub-sectors
  - Adjustment to Canadian circumstances where appropriate

- Sectoral targets based on these stringent regulatory emissions requirements

- National caps have been established for the four main smog-forming pollutants
National caps for major smog-forming pollutants

- **Nitrogen Oxides (NOx)**: 600 kt, -40%
- **Sulphur Oxides (SOx)**: 840 kt, -55%
- **Volatile Organic Compounds (VOC)**: 360 kt, -43%
- **Particulate Matter (PM)**: 160 kt, -20%

2006 Industrial Air Emissions vs. 2015 Projected Industrial Air Emissions with proposed targets.
Turning the Corner: Taking Action to Fight Transportation Emissions
Transportation is a major source of GHG emissions – almost 200Mt
And a major source of air pollutants

**NOx**
- Transportation: 52.3%
- Off-Road Vehicles: 17.6%
- Marine: 4.9%
- Rail: 4.9%
- Aviation: 2.6%
- All Other Sectors: 47.7%

**VOC**
- Transportation: 30.7%
- Off-Road Vehicles: 15.4%
- Marine: 0.4%
- Rail: 0.2%
- Aviation: 0.5%
- All Other Sectors: 69.3%

**TPM**
- Transportation: 9.1%
- Off-Road Vehicles: 5.8%
- Marine: 0.8%
- Rail: 0.5%
- Aviation: 0.1%
- On-Road Vehicles: 90.9%

**SOx**
- Transportation: 3.2%
- Off-Road Vehicles: 0.8%
- Marine: 1.6%
- Rail: 0.3%
- Aviation: 0.2%
- On-Road Vehicles: 96.8%
Transportation GHG emissions are growing

- Increasing passenger vehicle size and VKT
- Increasing volumes of freight
But past actions to reduce on- & off-road emissions are yielding results
Emissions trends have informed policy direction for the agenda for GHGs

- For the first time in Canadian history, fuel consumption for cars and light trucks will be regulated, effective with the 2011 model year
  - To be at least as stringent as those proposed in the US
  - Builds on an existing MOU to reduce GHG emissions by 5.3Mt
- New national regulations will require an average 5% renewable fuel content in gasoline and 2% in diesel
  - Supplemented by investments to expand sustainable renewable fuel production, including next-generation biofuels
- The Government is also promoting cleaner vehicles/technologies and addressing freight emissions
  - The 2008 budget provided $250M for R&D on innovative, greener and more fuel-efficient vehicles
    - Will lever other federally-funded University research programs and supplement federal R&D programs
  - A “feebate” program is being wound down, but “fee” will remain
  - Modest freight technology demonstration and adoption support
Canada will deepen and expand its air pollution regulatory alignment with the US

• Alignment on on-road and off-road will continue
  – Already includes air pollutant regulations for passenger cars and trucks, motorcycles, buses, transport trucks, off-road small spark-ignition engines, and compression-Ignition engines used in construction, mining, farming and forestry machines
    ▪ Including amendments to reflect recent US improvements
  – Will be expanded to include emissions from recreational equipment such as outboard engines, personal watercraft, snowmobiles, off-road motorcycles and ATVS

• For the first time, Canada will also regulate locomotive emissions in alignment with US requirements, effective in 2011.
  – Building on an MOU that expires in 2010
Canada will also support action to reduce international emissions

- For ocean-going ships, the government supports the development of new international standards, established by the International Maritime Organization, for controlling air pollution emissions from large ocean-going ships.
  - Canada is working with the US to determine whether to designate, through the IMO, North American coasts as areas where ships must reduce sulphur emissions (SECAs).
  - Momentum at the IMO seems to be building to tighten standards for both SOx and NOx emissions, and CO2 work is being launched.

- Aviation: The Minister of Transport will support the development of international standards and recommended practices with the International Civil Aviation Organization for emissions from aviation sources.
  - ICAO also looking at emissions trading
  - EU initiative capturing attention
Some thoughts for NARSTO

- The issues of climate change, and international emissions more generally, are complex. Making progress is slow.
  - Good information helps
  - Research linking climate change and clean air may facilitate Annex 2 country participation post 2012
    - India, China are key
- Regulators need to better understand air quality effects of climate change to ensure that clean air benefits are delivered
- With the growth of international trade, more focus needs to be placed on the impacts on:
  - Air quality in major port areas (confluence of rail, truck and marine activities in urban settings)
  - Air quality in special areas, such as SECAs
- The Arctic may be a special case deserving NARSTO attention as CC impacts are most pronounced in the North.
  - Methane releases from permafrost could be significant
  - Environmental impact scenarios arising from increased shipping emissions (NW Passage)
Supplementary Slides
Cleaner fuel standard and definition of new facilities

- To provide incentives to adopt the best available technologies for new facilities, new facilities will face a target based on a cleaner fuel standard
  - The cleaner fuel standard will be sector-specific
  - There will be an incentive until 2018 for facilities to be built carbon-capture ready

- New facilities are defined as those whose first year of operation is 2004 or later and include greenfield facilities, major expansions and major transformations
  - Greenfield facilities: built where no facility existed before
  - Major expansions: 25% increase in the physical capacity of an existing facility
  - Major transformations: where there has been significant changes to process
# Cleaner Fuel Standard

<table>
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<tr>
<th>Sector</th>
<th>Proposed target basis for new facilities</th>
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| Oil Sands                                   | • Process-specific cleaner fuel standards for mining, in situ, and upgrading  
  • Based on natural gas  
  • Incentive for carbon capture ready until 2018  
  • Additional requirements for in-situ and upgrading facilities coming on line in 2012 or later |
| Electricity                                 | • Fuel-specific cleaner fuel standard equivalent to the emission-intensity performance of  
  • "supercritical" technology for coal, "natural gas combined cycle" technology for gas, and "oil-fired gas turbine" technology for oil  
  • Incentive for carbon capture ready until 2018  
  • Additional requirements for coal-fired facilities coming on line in 2012 or later |
| Petroleum Refining, Chemicals and Fertilizers | • Process-specific cleaner fuel standard  
  • Based on natural gas  
  • Incentive for carbon capture ready until 2018 |
| Upstream oil & gas, Natural gas pipelines, Potash | • Process-specific cleaner fuel standard  
  • Based on natural gas |
| Iron ore pelletizing, Lime, Iron and steel, Titanium, Pulp and paper, Aluminum and alumina, Cement, Base metal smelters | • Process-specific technology |
# Implications of cleaner fuel standard for upgraders and in-situ oil sands plants

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<td><strong>Existing facilities</strong>&lt;br&gt;Starting in 2010</td>
<td><strong>New facilities</strong>&lt;br&gt;Starting in 2004 to 2011</td>
<td><strong>New facilities</strong>&lt;br&gt;Starting in 2012 or later</td>
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<td>• Mandatory reductions becoming tougher every year (18%/2%)</td>
<td>• Cleaner fuel standard based on natural gas; standard suspended until 2018 if built capture-ready&lt;br&gt;• 3-year commissioning period + 2% continuous improvement</td>
<td>• From 2012 to 2017: Cleaner fuel standard based on natural gas; standard suspended until 2018 if built capture-ready&lt;br&gt;• From 2018 on: Cleaner fuel Standard based on carbon capture and storage technology</td>
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<td><strong>All facilities currently under construction, approved, or at late planning stage would meet the standard</strong></td>
<td><strong>All upgraders that have been through approval process would meet the standard</strong></td>
<td>• 7 in-situ plants that have been through approval process are not being designed capture ready&lt;br&gt;• Those under discussion have time to adjust their design</td>
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**Green:** in conformity with proposed targets  
**Yellow:** have time to make adjustments to their design  
**Orange:** have already received approval and could have to redo some of the approval steps as well as make adjustments to their design
# Implications of cleaner fuel standard for coal-fired power plants

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<td>• Mandatory reductions becoming tougher every year (18%/2%)</td>
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<td>• 3-year commissioning period +2% continuous improvement</td>
<td>• From 2018 on: Cleaner fuel standard equivalent to the emission-intensity of “Integrated Gasification and Combined Cycle with carbon capture and storage” technology</td>
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<td>• All facilities operating or under construction meet the standard</td>
<td>• All facilities in planning stage, but not yet approved, would meet the standard</td>
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**Green:** in conformity with proposed targets