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Clean Air Regulatory Agenda – Regulatory Framework for Industrial Air Emissions

**In-depth Technical Briefing
April 30, May 1 and 2, 2007**

The Government is following through on its October commitment

- The Notice of Intent (October 21, 2006) publicly stated the Government of Canada's commitment to develop a regulatory framework for industrial air emissions.
- The government consulted extensively with key stakeholders in November-December 2006.
- Individual Canadians had the opportunity to submit formal comments over a 60-day period.
- Consultations and formal comments were instrumental in shaping/refining this Regulatory Framework for Air Emissions.



The Regulatory Framework provides a nationally consistent approach to reduce air emissions

- **Responding to**
 - Uneven effort across the country to reduce air emissions
 - Inconsistent messages to industry
 - Insufficient action to protect health and the environment
- **This approach provides**
 - Tangible benefits for Canadians and their environment
 - Nationally consistent regulations
 - Continued competitiveness of our economy
 - A level playing field across Canada
 - The basis for negotiations with our international partners



The framework will be implemented working with provinces/territories, industry and stakeholders

- Work being undertaken is to:
 - Validate sector-specific air pollutant targets by June 2007, including their date of coming into force
 - Translate greenhouse gas target structure into sector-specific regulatory targets
 - Address the scope of offsets system and the administration of technology fund
 - Develop sector-specific air emissions regulations
- Finalize air pollutant regulatory framework by fall 2007
- Begin publication of draft regulations by spring 2008
- Finalize all regulations by 2010





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Greenhouse Gases



Greenhouse gas emission targets

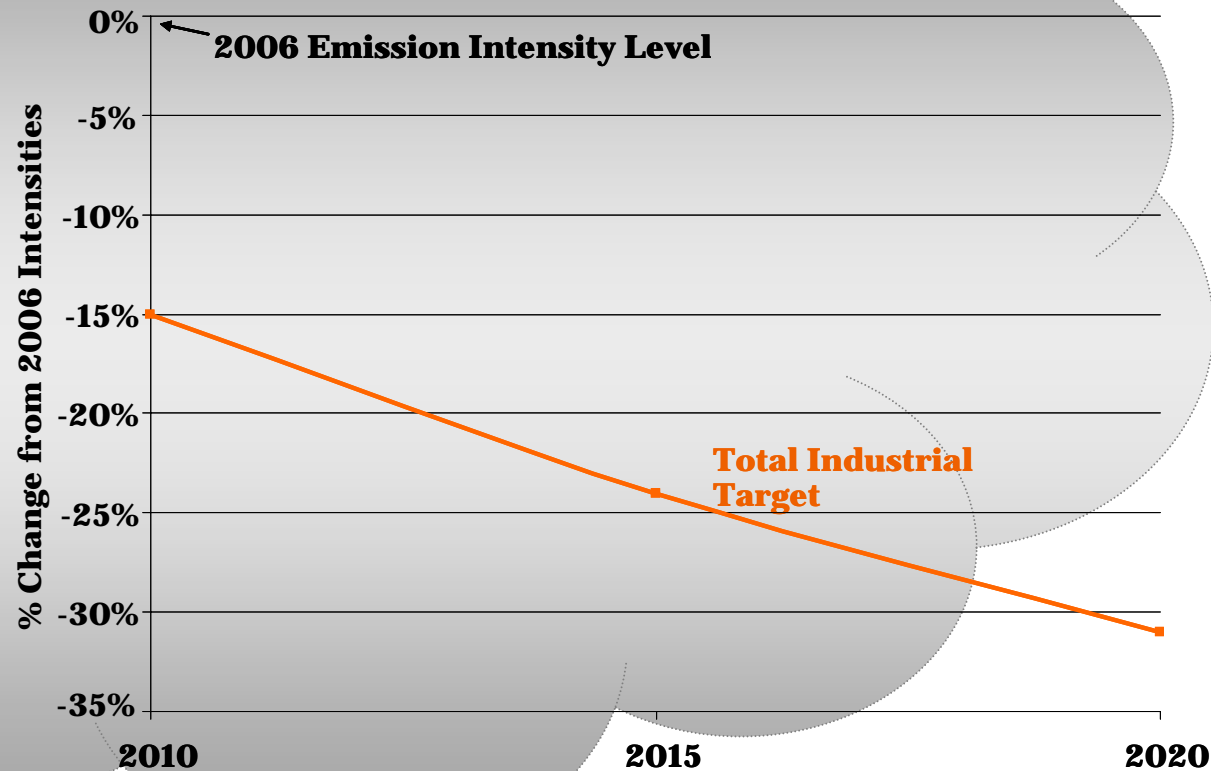
Target

Existing facilities

- 6% improvement each year from 2007 to 2010, giving an enforceable 18% reduction from 2006 emission intensity in 2010
- 2% annual improvement thereafter

New facilities

- 3-year grace period
- Clean fuel standard
- 2% annual improvement



Greenhouse gas compliance options

Ways to comply



In-house reductions

Climate Change Technology fund: one fund/two components

- Deployment & Infrastructure: focus on opportunities for near-term emission reductions: access as % of total target over 2010-2017 period – 70%, 65%, 60%, 55%, 50%, 40%, 10%, 10%
- Research & Development: focus on new transformative technologies: access over 2010-2017 period – 5 Mt annually
- Explore credit for certified project investments
- Contribution rate to funds (\$/tonne over 2010-2017 period) – \$15, \$15, \$15, \$20, \$20 escalating with GDP

Trading

- Domestic inter-firm trading
- Access to domestic offsets
- Access to the Clean Development Mechanism at 10% of each firms' total target
- Actively explore Canada-US linkages

Credit for early action of 15 Mt

- With a maximum of 5 Mt any given year



Estimated Sector GHG reductions in 2010

	Estimated Reductions by Sector in 2010				
	Sector Average	For Existing Facilities		Overall for Sector	
	Estimated Fixed Process Emissions (% of Total Emissions)	Estimated % Reduction from Year 2006 Emission Intensity	Estimated Mt Reduction from Projected 2010 Emission Levels	Estimated % Reduction from Year 2006 Emission Intensity	Estimated Mt Reduction from Projected 2010 Emission Levels
TOTAL (% reductions are a weighted average)	10%	16%	~ 48 Mt	15%	~ 49 Mt
Electricity	0%	18%	20.7	17%	20.9
Upstream Oil and Gas	0%	18%	6.9	18%	6.9
Petroleum Refining	5%	17%	8.4	17%	8.4
Oil Sands	6%	17%	2.8	13%	3.5
Natural Gas Pipelines	0%	18%	1.5	18%	1.5
Pulp and Paper	1%	18%	1.2	18%	1.2
Iron & Steel, Titanium	35%	13%	1.3	12%	1.3
Chemicals	18%	15%	1.9	15%	1.9
Aluminum & Alumina	33%	12%	1.1	12%	1.1
Base Metal Smelting	5%	17%	0.3	17%	0.3
Mining	16%	15%	0.6	15%	0.6
Cement	68%	6%	0.9	6%	0.9
Lime	66%	6%	0.2	6%	0.2

Estimated Sector GHG reductions in 2015

	Estimated Reductions by Sector in 2015				
	Sector Average	For Existing Facilities		Overall for Sector	
	Estimated Fixed Process Emissions (% of Total Emissions)	Estimated % Reduction from Year 2006 Emission Intensity	Estimated Mt Reduction from Projected 2015 Emission Levels	Estimated % Reduction from Year 2006 Emission Intensity	Estimated Mt Reduction from Projected 2015 Emission Levels
TOTAL (% reductions are a weighted average)	10%	24%	~ 67 Mt	24%	~ 72 Mt
Electricity	0%	28%	27.4	31%	28.1
Upstream Oil and Gas	0%	26%	8.9	26%	8.9
Petroleum Refining	5%	25%	12.6	25%	12.6
Oil Sands	6%	24%	5.1	18%	8.9
Natural Gas Pipelines	0%	26%	2.7	26%	2.7
Pulp and Paper	1%	26%	1.7	26%	1.7
Iron & Steel, Titanium	35%	18%	1.6	17%	1.6
Chemicals	18%	21%	3.0	21%	3.0
Aluminum & Alumina	33%	16%	1.1	16%	1.1
Base Metal Smelting	5%	25%	0.5	25%	0.5
Mining	16%	22%	0.8	22%	0.8
Cement	68%	8%	1.2	8%	1.2
Lime	66%	9%	0.3	9%	0.3

Estimated Sector GHG reductions in 2020

	Estimated Reductions by Sector in 2020				
	Sector Average	For Existing Facilities		Overall for Sector	
	Estimated Fixed Process Emissions (% of Total Emissions)	Estimated % Reduction from Year 2006 Emission Intensity	Estimated Mt Reduction from Projected 2020 Emission Levels	Estimated % Reduction from Year 2006 Emission Intensity	Estimated Mt Reduction from Projected 2020 Emission Levels
TOTAL (% reductions are a weighted average)	10%	31%	~ 77 Mt	31%	~ 88 Mt
Electricity	0%	38%	28.0	41%	29.9
Upstream Oil and Gas	0%	33%	8.4	33%	8.4
Petroleum Refining	5%	31%	16.3	31%	16.3
Oil Sands	6%	31%	7.0	23%	15.5
Natural Gas Pipelines	0%	33%	4.3	33%	4.3
Pulp and Paper	1%	33%	2.0	33%	2.0
Iron & Steel, Titanium	35%	23%	1.9	21%	1.9
Chemicals	18%	28%	4.3	27%	4.3
Aluminum & Alumina	33%	22%	1.2	22%	1.2
Base Metal Smelting	5%	31%	0.6	31%	0.6
Mining	16%	28%	1.1	28%	1.1
Cement	68%	11%	1.6	11%	1.6
Lime	66%	11%	0.3	11%	0.3





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Air Pollutants



Air pollutant targets are 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 (e.g.: oil sands)
 - Adjustment to Canadian circumstances where appropriate
- Identified sectoral targets based on these stringent regulatory emissions requirements
- Calculated national caps for the four main smog-forming pollutants



Air pollutant emission targets

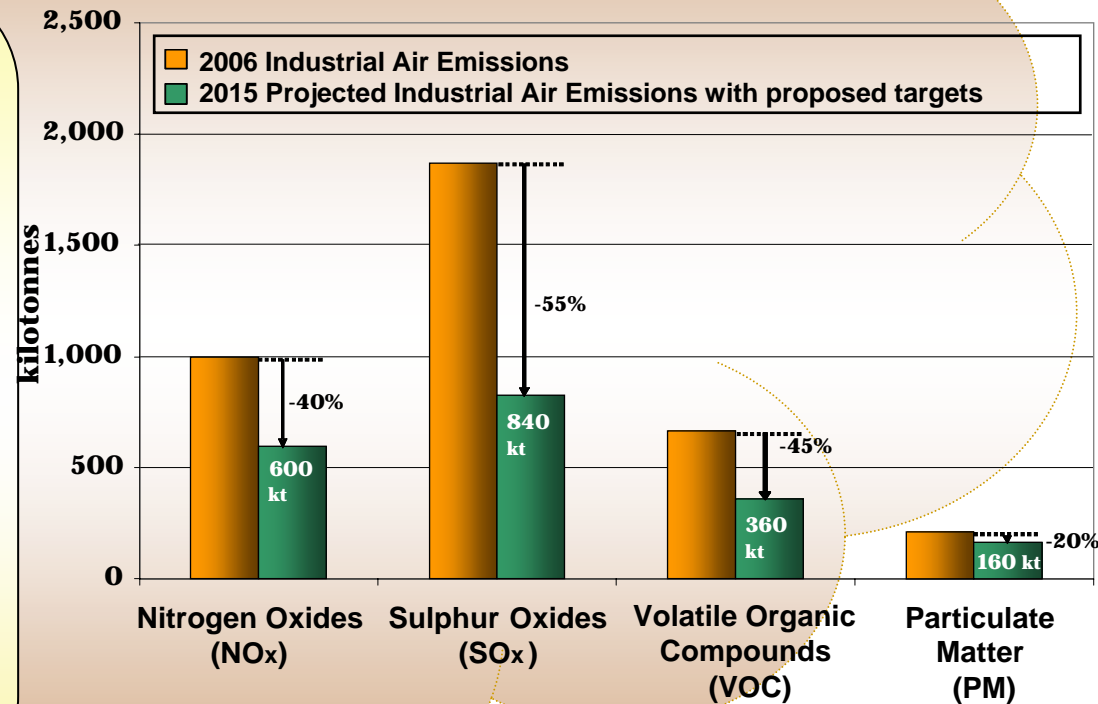
Targets

NATIONAL CAPS for 2012 to 2015
(% reduction from 2006 emissions)

- NO_x – 600 kt Cap (~40%)
- SO_x – 840 kt Cap (~55%)
- VOCs – 360 kt Cap (~45%)
- PM – 160 kt Cap (~20%)

+
SECTOR SPECIFIC CAPS
for 2012 to 2015

ALL TO BE VALIDATED BY JUNE
2007, INCLUDING THE DATE OF
COMING INTO FORCE



Air pollutant compliance options

Ways to comply

In-house Reductions

- Fuel switching
- Equipment and process upgrades
- Control technologies

Domestic Trading for NO_x and SO_x

- Cap and trade system
- Feasibility of offsets will be assessed

Pursue discussions on Canada-US trading for NO_x and SO_x



Air Pollutants Targets – Alumina and Aluminum Sectors

Alumina

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
SO_x	6,084	6,084	2,950	-52%	Canada
PM	454	454	256	-44%	Canada

Aluminum

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
SO_x	62,022	65,000	62,000	0%	Quebec
PM	9,698	8,500	9,365	-3%	Quebec & EU OSPAR *
Fluorides	2,618		2,600	0%	Quebec
PAHs	393		113	-71%	Quebec

* OSPAR: Oslo-Paris Convention



Air Pollutants Targets – Base Metal Smelters and Cement Sectors

Base Metal Smelters

	2006 Estimated Emissions (tonnes)	2006 Estimated Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
SO_x	667,822	621,396	220,000	-67%	CEPA P2 Plan, * April 2006
PM	7,222	7,315	3,600	-50%	CEPA P2 Plan
Mercury	1.80		0.80	-56%	CEPA P2 Plan / CCME **

* CEPA P2 Plan: *Canadian Environmental Protection Act* Pollution Prevention Plan

** CCME: Canadian Council of Ministers of the Environment

Cement

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
NO_x	46,188	51,020	26,266	-44%	GVRD *
SO_x	40,564	44,808	21,451	-45%	GVRD
PM	4,732	5,227	865	-82%	GVRD

* GVRD: Greater Vancouver Regional District



Air Pollutants Targets – Chemicals and Electricity Sectors

Chemicals (including Fertilizers)

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
NO_x	27,895	32,670	24,503	-12%	U.S.
SO_x	25,360	29,961	25,300	0%	Canada
VOC	14,281	17,228	14,280	0%	U.S.
Ammonia	9,914	12,167	8,716	-12%	Australia

Electricity Generation Produced by Combustion

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
NO_x	258,000	267,000	105,000	-59%	U.S.
SO_x	518,000	489,000	206,000	-60%	U.S.
PM	33,000	35,000	15,000	-55%	U.S.
Mercury	2.073		1.078	-48%	U.S. Clean Air Mercury Rule

Air Pollutants Targets – Forest Products Sectors

Pulp and Paper

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
SO_x	61,500	59,853	41,700	-32%	PPAQF *
PM	28,900	31,572	23,000	-20%	PPAQF

* PPAQF: Pulp and Paper Air Quality Forum

Wood Products

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
VOC	48,547	53,516	40,500	-17%	U.S.
PM	75,950	85,007	57,000	-25%	Quebec

Air Pollutants Targets – Iron and Steel and Iron Ore Pelletizing Sectors

Iron and Steel (including Titanium)

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
NO_x	11,946	11,946	4,181	-65%	U.S.
SO_x	29,137	29,137	5,827	-80%	U.S.
VOC	1,868	1,868	560	-70%	CCME *
PM	8,611	8,611	2,583	-70%	Canada/U.S.
Benzene	315		95	-70%	Federal Code of Practice

* CCME: Canadian Council of Ministers of the Environment

Iron Ore Pelletizing

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
NO_x	8,903	8,903	6,200	-30%	World Bank/EU
SO_x	16,431	16,431	4,100	-75%	EU
PM	9,956	9,956	3,500	-65%	U.S. EPA * / UN ECE **

* EPA: Environmental Protection Agency

** ECE: Economic Commission for Europe



Air Pollutants Targets – Lime Sector

Lime

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
NO_x	3,587	3,587	3,309	-8%	Various
SO_x	3,439	3,439	2,757	-20%	Various
PM	1,814	1,814	270	-85%	Various



Air Pollutants Targets – Oil and Gas Sectors

Upstream Oil and Gas (excluding Oil Sands)

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
NO _x	424,000	428,000	235,000	-45%	U.S. & technology
SO _x	195,000	170,000	145,000	-25%	Canada
VOC	495,000	400,000	160,000	-65%	Alberta
Benzene	1,998		1,300	-35%	Alberta

Oil Sands

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
NO _x	76,000	132,000	80,000	+5%	U.S./Alberta
SO _x	158,000	108,000	70,000	-55%	U.S./ Alberta
VOC	63,000	200,000	100,000	+60%	U.S./ Alberta

Air Pollutants Targets – Oil and Gas Sectors

Petroleum Refining

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
NO _x	31,045	30,247	18,100	-40%	U.S
SO _x	98,651	94,957	29,000	-70%	U.S.
VOC	14,000	23,486	14,000	0%	Canada
Benzene	100		85	-15%	U.S. average performance

Pipelines

	2006 Estimated Emissions (tonnes)	2015 Projected Emissions (tonnes)	2015 Emissions Target (with reduction) (tonnes)	% Emission Change in 2015 from 2006 with Target	Basis for Target or Jurisdiction
NO _x	47,000	50,000	28,500	-40%	CCME * & technology

* CCME: Canadian Council of Ministers of the Environment





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“Business-As-Usual” Projection



“Business-As-Usual” projection

- Developing targets for air emissions requires a projection of emissions and, in the case of emissions intensity targets, of the output, that would have occurred in the absence of the regulations – which is referred to as a “business-as-usual” (BAU) projection.
- The key document for the BAU projection is *Canada’s Energy Outlook: The Reference Case 2006* (CEO 2006).
- CEO 2006 provides “business-as-usual” production and greenhouse gas emission projections for Canada as a whole and for various sectors of the economy.



“Business-As-Usual” projection

- The production projections were used as the basis for both greenhouse gas and air pollutant targets.
- Additional sources of information were needed to complement it for purposes of greenhouse gas emission projections because the CEO 2006 projections are not sufficiently disaggregated by industrial sector, especially for the mining and manufacturing sectors.
- A separate but consistent BAU projection of air pollutant emissions was developed because CEO 2006 does not include air pollutant emissions.



BAU GHG emissions projection

- The CEO 2006 projections of both emissions and production were used as a basis for the assessment of the greenhouse gas targets for electricity and most oil and gas sectors, with some minor modifications due to differences in coverage.
- For the majority of the remaining sectors, the CEO 2006 emission projections were combined with production growth and emission intensity improvement estimates from Environment Canada to provide the basis for assessment.



BAU GHG emissions projection (cont'd)

- In addition, adjustments were made to the CEO 2006 projections to reflect information that has become available since its publication.
- Projected emissions from the cement, lime, pulp and paper, and iron and steel sectors were adjusted downward to reflect the most recent production and emissions intensity data.



BAU GHG emissions projection

Sector	CEO 2006 (Mt)			BAU used in setting the targets (Mt)		
	2010	2015	2020	2010	2015	2020
Power Generation	131	127	125	131	127	125
Oil and Gas						
Upstream oil and gas	82	75	61	82	75	61
Upstream oil and gas, subtract unintentional fugitives ¹				45	41	33
Refineries	31	35	38	31	35	38
Oil sands	64	80	93	64	80	93
Pipelines ²	9	9	9	9	9	9
Pipelines, add intentional fugitives				11	11	10
Total	186	199	201	150	165	174
Mining and Manufacturing						
Pulp and paper ³	9	9	9	8	8	8
Iron and steel ³	16	16	16	14	13	12
Chemicals	17	18	19	17	18	19
Aluminum	10	9	9	10	9	9
Smelting and refining	4	4	4	4	4	4
Mining	4	4	4	4	4	4
Cement and lime ³	15	16	17	15	16	16
Total	74	76	78	72	72	73
TOTAL Industry	391	402	404	352	365	372

Sums may not match totals due to rounding.

¹ Unintentional fugitive emissions will be addressed separately.

² The BAU used for target setting includes intentional fugitive emissions.

³ The BAU projection reflects more recent production and emission intensity information.



BAU air pollutant emissions projection

- The emissions projections used to develop the 2015 targets for air pollutants are based on the Canadian Criteria Air Contaminants (CAC) Emissions Outlook, adjusted in most cases to reflect the projected production numbers from CEO 2006 or other factors described below.
- The CAC Emissions Outlook provided “business-as-usual” projections for each of the ten provinces and three territories (Northwest Territories and Nunavut are treated as one region) for all industrial and non-industrial sources of emissions.



BAU air pollutant emissions projection (cont'd)

- The CAC Emissions Outlook was developed using the 2000 CAC Emissions Inventory, and *Canada's Emissions Outlook*, published in December 1999 by NRCan (CEO 1999).
- The projections also include sector-specific adjustments based on input from interested stakeholders, industry and government (federal, provincial and territorial) experts, and industry associations.

BAU air pollutant emissions projection

- The projections in the CAC Emissions Outlook have been adjusted in most cases to incorporate information provided by Environment Canada sector experts. These adjustments were made:
 - to take into account the most recent production data from the CEO 2006 or the most recent data from other sources on emissions of air pollutants;
 - to incorporate improvements in emission estimation methodologies in order to ensure consistency with the 2006 baseline emission estimates; or
 - to account for differences in sector definitions and covered sources for targeted sectors when compared with the published CAC Emissions Outlook.



BAU air pollutant emissions projection

Sector	CAC Emissions Outlook				BAU used in setting the targets			
	2015 Emissions (kt)				2015 Emissions (kt)			
	NO _x	SO _x	VOC	PM	NO _x	SO _x	VOC	PM
Power Generation	267	489	4	35	267	489	4	35
Oil and Gas								
Upstream oil and gas ¹	436	269	756	5	428	170	400	9
Refineries	30	95	23	8	30	95	23	8
Oil sands	196	164	303	36	132	108	200	24
Pipelines ¹	N/A	N/A	N/A	N/A	50	-	-	-
Mining and Manufacturing								
Pulp and paper	60	70	24	55	49	60	23	32
Wood products	18	2	47	111	13	2.5	54	85
Iron and steel	15	29	22	24	12	29	1.9	9
Chemicals ²	49	11	41	10	33	30	17	5
Aluminum	1	66	2	14	1	65	2	9
Alumina	N/A	N/A	N/A	N/A	1	6	-	-
Base metal smelting ³	3	621	-	23	3	621	-	7
Iron ore pelletizing ³	18	23	4	51	9	16	2	10
Cement ³	36	33	-	15	51	45	-	5
Lime	N/A	N/A	N/A	N/A	4	3	-	2

¹ The Upstream oil and gas and Pipelines values for VOCs include unintentional fugitive emissions.

² The Chemicals sector includes the following four sub-categories of the CAC Emissions Outlook: chemicals industry; paint and varnish manufacturing; petrochemical industry; and plastics and synthetic resins fabrication.

³ A difference in emissions exists due to a difference in coverage because the BAU used in setting the targets was adjusted to address only the part of the sector for which targets are set. For example, cement only, not cement and concrete.



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Anticipated Impacts & Benefits of Regulating Industry

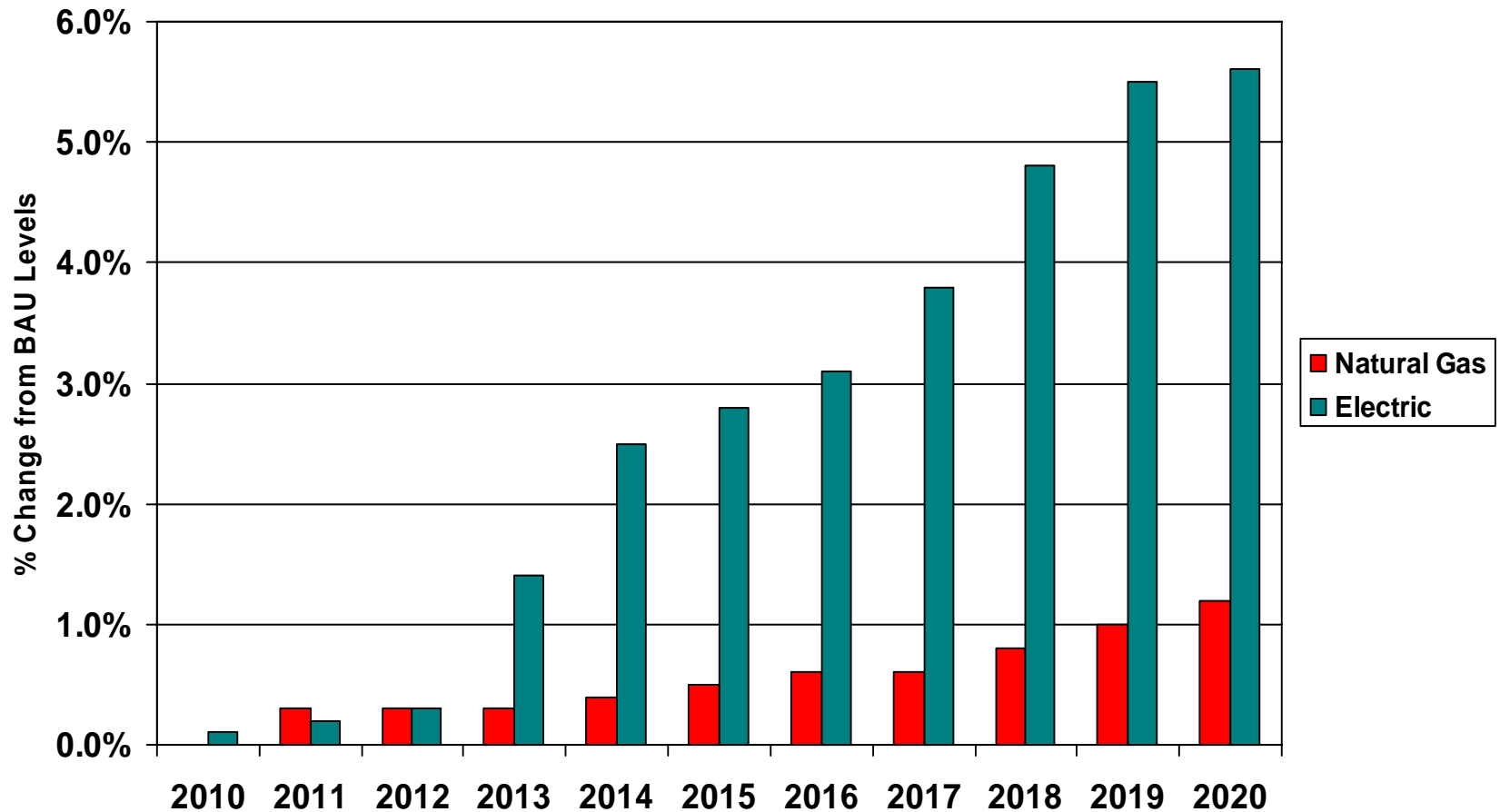


National economic impacts will be manageable

- Total package (regulations and ecoACTION initiatives) has impacts that are below -0.5% of GDP for any given year throughout the forecast period.
 - Costs are highest in post-2015 period when package is mature.
 - Regulatory package for climate change and air pollutants is the largest contributor to GDP impacts.
- Compliance options provide the time and flexibility to meet targets through technology improvements rather than output changes.
 - Complements normal capital turnover cycles.
 - Permits relatively cost-effective roll-out of major technologies such as carbon capture and sequestration by 2016 or so.
- As a result, GDP impacts in the pre-2015 period in particular are somewhat offset by increased investment activity.
 - Energy efficiency savings dampen cost impacts throughout the forecast period.



Energy price changes will be a significant driver of overall economic impacts



No discernible impacts expected on national transportation fuel prices.



Health Benefits will be significant

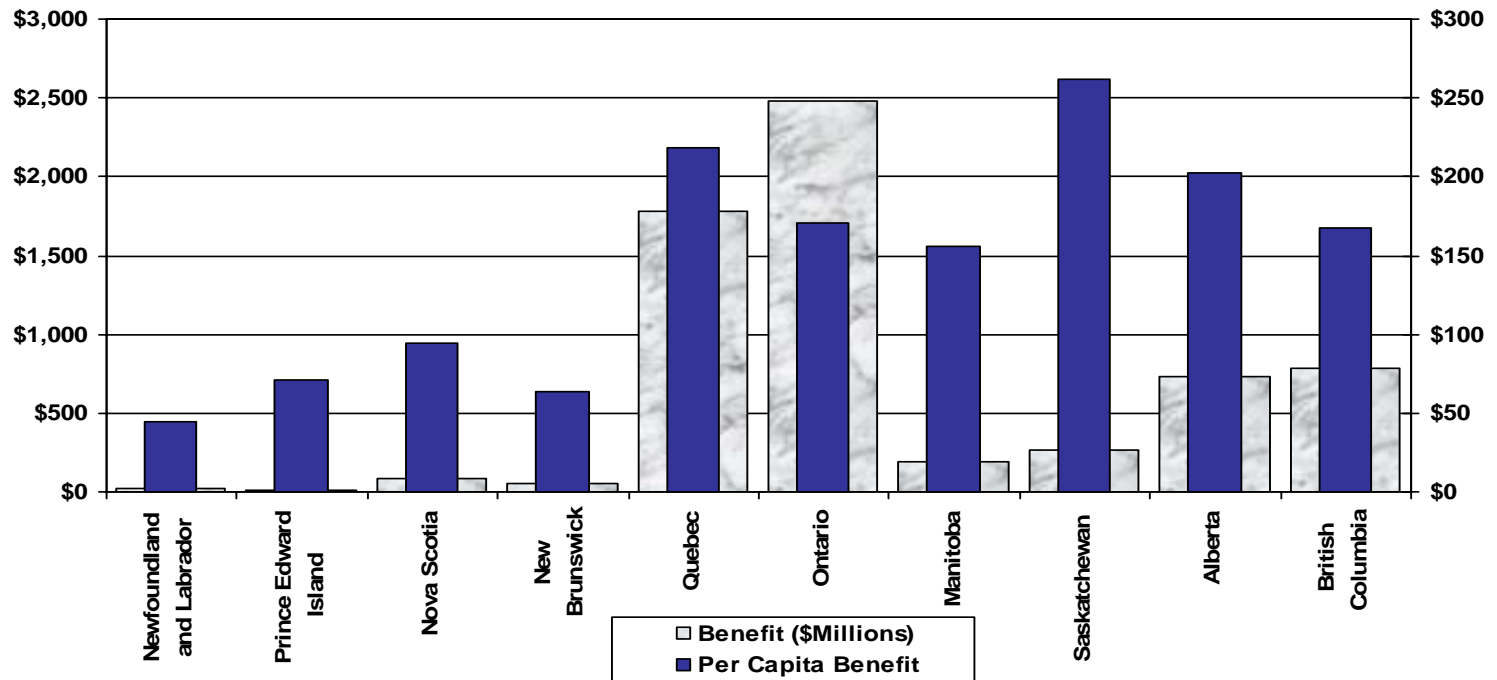
	Health Benefits (2015)	Value (2006 millions)
Deaths	1,200	\$6,000
Chronic Bronchitis Cases	920	\$330
Hospital Admissions and Emergency Visits	1,260	\$3
Child Acute Bronchitis Episodes	5,600	\$2
Asthma Days	170,000	\$10
Restricted Activity Days	1,000,000	\$57
Minor Restricted Activity Days	210,000	\$5
Minor Symptom Days	3,400,000	\$34
	TOTAL	\$6,400

- Estimated health impacts indicate that benefits will occur across a range of health conditions sensitive to air quality.
- These benefits include an estimated 1,200 fewer premature deaths per year as a result of the air pollution reductions foreseen under regulations.
- Avoided deaths also account for the lion's share of the \$6.4 billion in monetized benefits of regulating clean air, with an expected annual value of \$6 billion by 2015.



Health Benefits follow regional differences in population and air quality

Health Benefits 2015



- Total health benefits generally follow the distribution of population across provinces.
- On a per capita basis, benefits are highest for residents of Quebec (about \$225), Saskatchewan (\$260) and Alberta (\$200).



Next steps for cost and benefit analysis

- Focus will now shift from support for policy development to Regulatory Impact Assessment (RIAS) under the *Canadian Environmental Protection Act, 1999*.
- Will be looking to stakeholders for information to assist in defining sector-specific costs as the basis for RIAS.
 - This will also assist provincial governments in determining impacts within their respective jurisdictions.
- On the RIAS benefits side, Environment Canada will work with industry and other jurisdictions to develop more comprehensive understanding of the broader range of benefits.
 - Including, e.g. benefits for forest productivity, fisheries, tourism and recreation, infrastructure erosion, biodiversity and ecosystems.





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Next Steps



Section 71 notice

- To support the development and implementation of regulations, comprehensive and consistent baseline data for 2006 will be required from facilities in the regulated sectors.
- To this end, the government will require facilities in those sectors that will be covered by the regulations to report 2006 emissions and other relevant data under a notice issued under section 71 of the *Canadian Environmental Protection Act, 1999*.



Continued engagement

- Series of meetings over the next several months
 - Sectoral discussions to
 - Validate air pollutant targets, including timeframe for their entry into force
 - Implement the GHG target structure by sector
 - Discussions on cross-cutting regulatory provisions
 - Trading
 - Offsets
 - Credit for early action
 - Technology fund
- Materials will be available online

