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Turning the Corner: Taking Action to Fight Climate Change

Technical Briefings
March 14, 2008



Canada's greenhouse gas emissions have grown steadily since 1990

- At Kyoto, Canada committed to a target of 6% below 1990 levels
- However, Canadian emissions have grown steadily since 1990
- Canada's annual greenhouse gas (GHG) emissions are currently more than 25% higher than they were in 1990 and 32% higher than Canada's Kyoto Protocol target
 - This growth is due in part to the continued expansion of Canada's production and export of oil & gas
- Without immediate action, our emissions from all sectors could increase by another 24% to reach 940 megatonnes in 2020

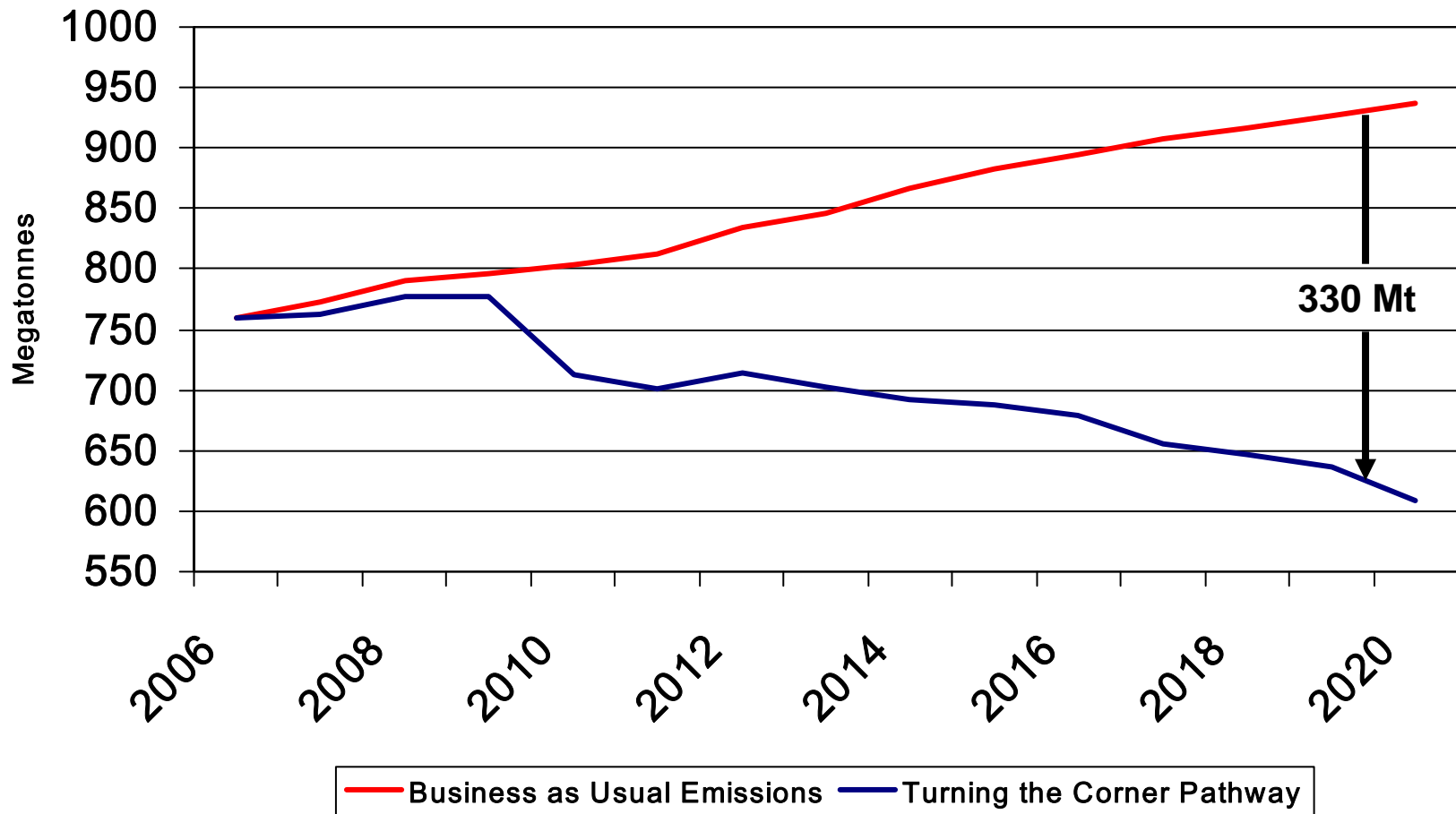


Canada's domestic action will better position us to contribute to a global solution

- Canada's domestic action, including developing and deploying new technologies, will position the country to contribute to a global solution to the challenge of climate change
 - Our commitment to cut our emissions 20% by 2020 is independent of any agreement on a post-2012 international framework
- Canada believes a new international climate change agreement should ensure global emissions are cut at least in half by 2050
- Canada is committed to playing an active and constructive role in the development of a new international agreement through the UNFCCC
- An effective new international agreement must include contributions from all major emitters, including the United States, China and India
 - While major developing economies can obviously not be expected to make the same kind of contributions as developed countries, the science clearly demonstrates that they must be part of the solution



Canada is taking measures to achieve a 330 megatonnes reduction from projected levels by 2020 representing 20% below 2006 levels



Canada's regulatory system will apply to all industries and get tougher over time

Regulations start tough and get tougher

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

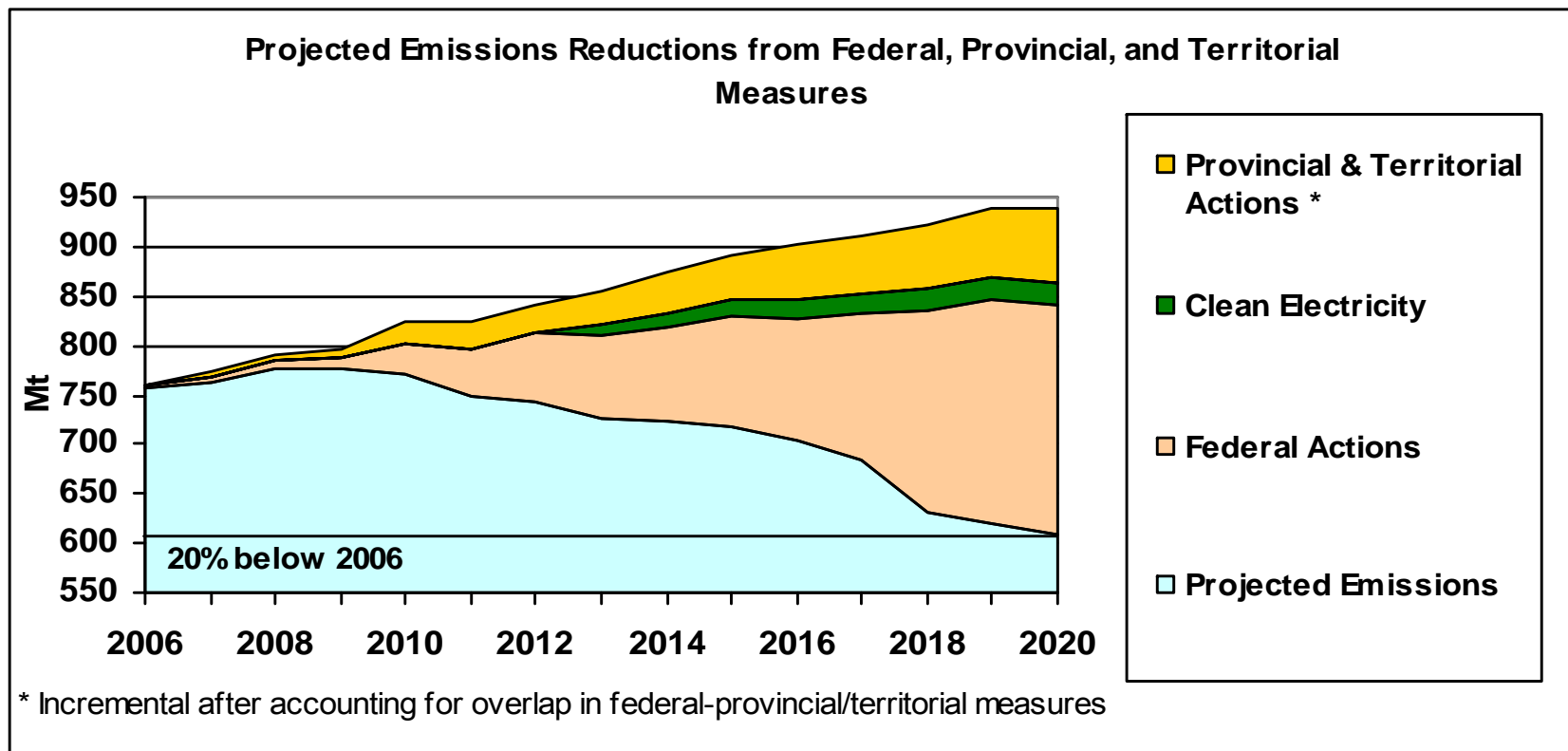
TOUGHEST

For oil sands and coal power plants coming on stream in 2012 and later:

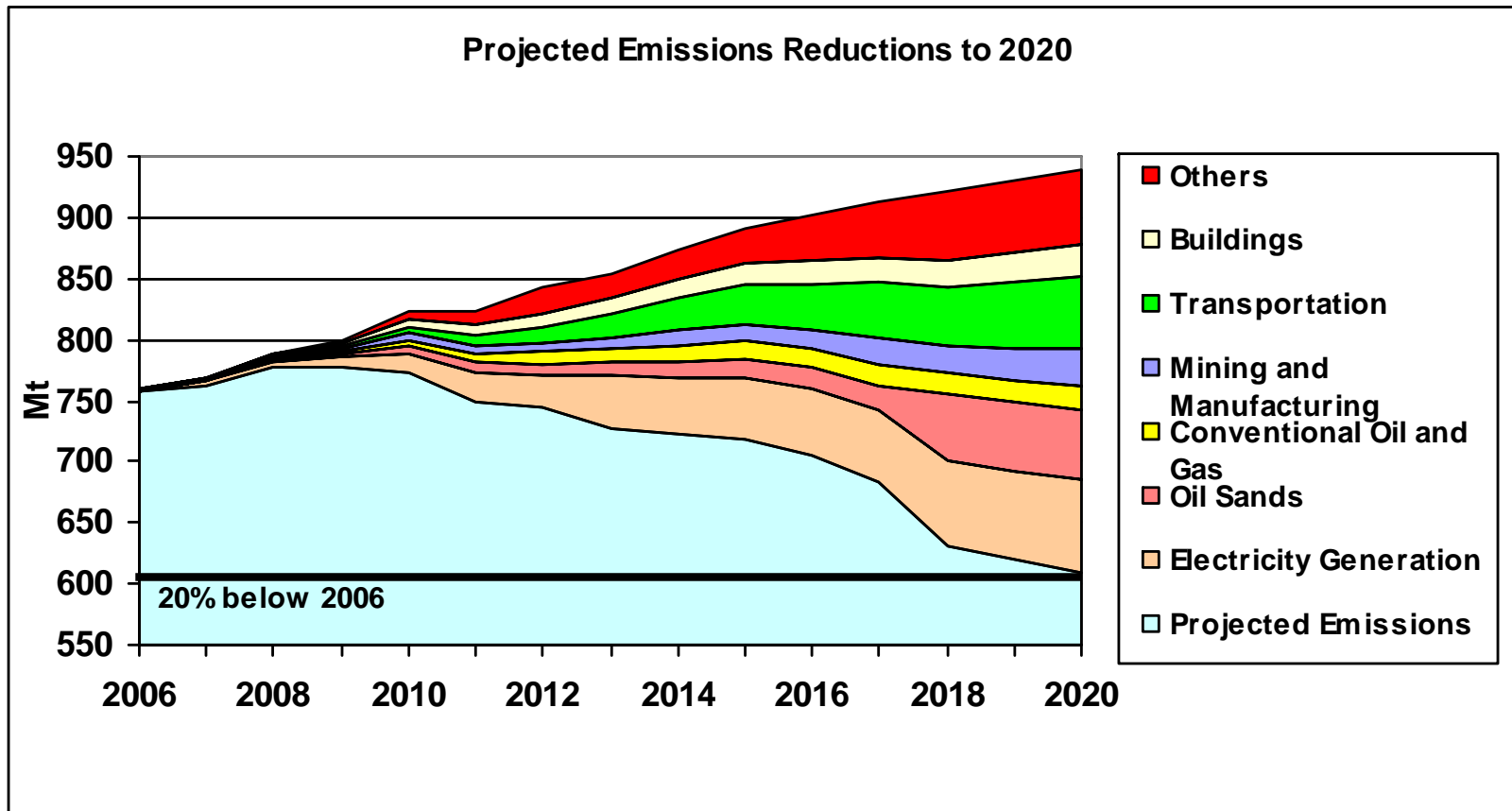
- An end to new dirty coal plants
- Effectively requiring that oil sands use carbon capture and storage or other green technology to drastically cut greenhouse gas emissions



Action by all levels of Government will enable Canada to reach its national goal



Canada's emissions reduction pathway to 2020 will engage all sectors of the economy





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Regulatory Framework – Final target elements



Target application

- Three approaches to target application:
 - Facility-specific: Each facility within a sector receives an individual target of an 18% reduction from its own 2006 emission intensity
 - Sector-wide: All facilities within a sector face the same target – an 18% reduction from the sector's average 2006 emission intensity
 - Corporate-specific: Each company within a sector receives a target of an 18% reduction from the average 2006 emission intensity of its entire fleet of facilities

Sector	Target Application		
	Facility-based	Sector-wide	Corporate
Iron Ore Pelletizing	X		
Lime		X	
Potash	X		
Base Metal Smelting	X		
Chemicals	X		
Fertilizers ¹	X		
Iron & Steel, Titanium	X		
Oil Sands	X		
Pulp & Paper		X	
Petroleum Refining	X		
Aluminium & Alumina		X	
Cement		X	
Natural Gas Pipelines	X		
Upstream Oil & Gas	X		
Electricity			X

1) Indicative until decisions are made post Task Force



Minimum thresholds

- Minimum thresholds will be set in 5 sectors to avoid imposing unreasonable administrative costs on small facilities, while still ensuring appropriate coverage of emissions
- In all other sectors, all facilities will be covered by the regulations

Sector	Proposed threshold
Chemicals	50 kt CO ₂ e
Fertilizers (Nitrogen-based) ¹	50 kt CO ₂ e
Natural Gas Pipelines	50 kt CO ₂ e
Upstream Oil & Gas	10,000 barrels / day (per company) and 3 kt CO ₂ e per facility
Electricity	10 MW

1) Indicative until decisions are made post Task Force



Fixed process emissions

- Fixed process emissions will receive a 0% target and are defined as those emissions that are:
 - from chemical processes that produce carbon dioxide emissions and are fixed to production; and
 - created in a process where:
 - carbon that is chemically bound in the raw materials is removed from these material to produce a carbon-free product (less than 1% carbon by mass); or
 - carbon is used to remove an undesired component form the raw material and where the raw material is not substitutable; or
 - unintentional oxidation of hydrocarbon feedstocks results from the catalytic conversion of these feedstocks into products; or
 - carbon dioxide entrained in ethane gas feedstock is removed and released to the atmosphere in order to process the feedstock
- Fixed process emissions **do not** include emissions resulting from:
 - combustion, where combustion is the exothermic reaction of a fuel with gaseous oxygen; or
 - a process that is for the purpose of reducing emissions of air pollutants from the facility; or
 - the release of formation carbon dioxide from the processing of crude oil or natural gas



Fixed process emissions

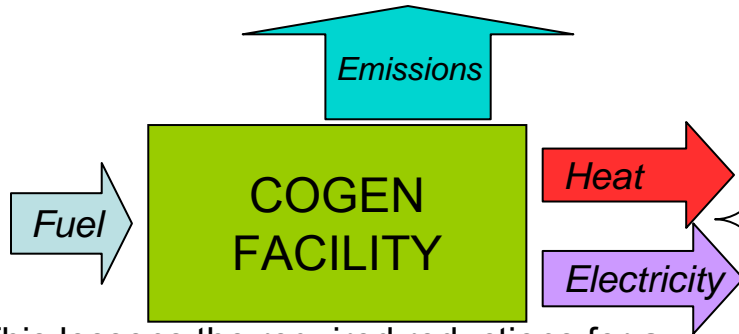
Sector	Estimate of percent fixed process emissions	Example of certain sources of fixed process emissions
Iron Ore Pelletizing	25%	Limestone and dolomite fluxes
Lime	66%	Calcination of limestone
Potash	0%	
Base Metal Smelters	10%	Fluxing agents, lead smelting, coke used as reducing agent in electric furnace, carbonate contained in ores, substances such as propane used as O ₂ scavenger
Chemicals	16%	Gypsum manufacture, titanium dioxide manufacture using the chloride process, ethylene oxide manufacture, PT acid
Fertilizer ¹	40%	Steam methane reforming
Iron & Steel, Ilmenite	62%	Carbon used for reduction of metal oxides in iron ore and ilmenite, limestone and other minerals used as fluxes, decarburization of pig iron and direct reduced iron
Oil Sands	6%	Steam methane reforming
Pulp & Paper	1%	Addition of CaCO ₃ or Na ₂ CO ₃ in lime kiln of chemical mills
Petroleum Refining	9%	Steam methane reforming
Aluminum & Alumina	48%	Electrolysis of alumina to aluminum
Cement	61%	Calcination of limestone
Natural Gas Pipelines	0%	
Upstream Oil & Gas	0%	
Electricity	0%	

1) Indicative until decisions are made post Task Force

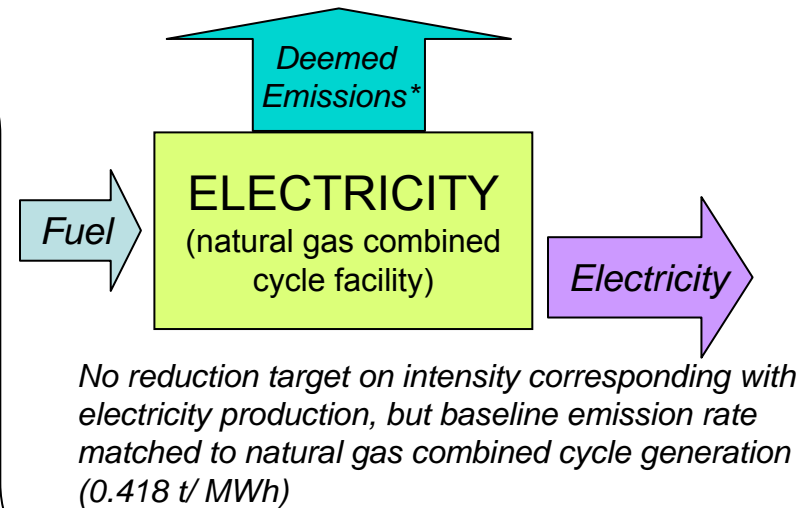
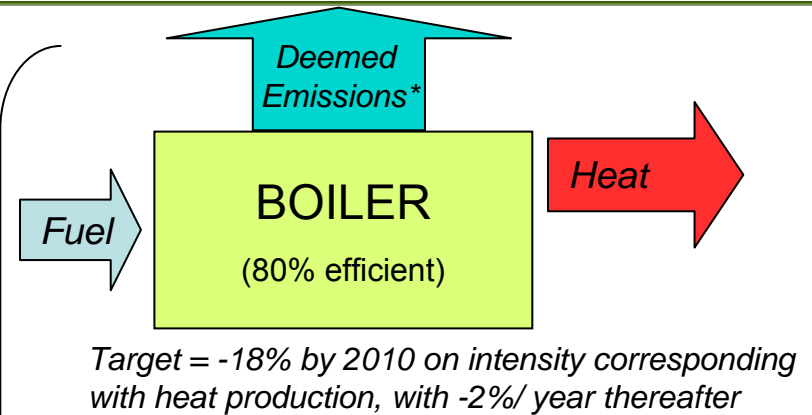


Incentive for co-generation through the target structure

- To reflect that efficiency gains inherent to co-generation, emission targets for these facilities are based on an adjusted (higher) baseline that equals emission levels from corresponding stand-alone heat and electricity units



- This lessens the required reductions for a co-generation facility
 - In some cases, may produce immediate credits



* Total "deemed emissions" would be greater than actual emissions from the cogeneration facility



Fertilizer sector and adipic acid production

- Fertilizer:
 - Mandate a two-person (a Member of Parliament and an industry representative) Task Force to return with options for a regulatory approach to this sector consistent with the overall Framework
- Adipic acid production:
 - An emission intensity target will be set for nitrous oxide emissions from adipic acid production that recognizes the voluntary early action taken by industry before any regulations required it
 - 2% continuous improvement requirement still applies



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

Sector	Proposed target basis for new facilities
Oil Sands	<ul style="list-style-type: none"> • Process-specific cleaner fuel standards for mining, in situ, and upgrading <ul style="list-style-type: none"> • Based on natural gas • Incentive for carbon capture ready until 2018 • <i>Additional requirements for in-situ and upgrading facilities coming on line in 2012 or later</i>
Electricity	<ul style="list-style-type: none"> • Fuel-specific cleaner fuel standard equivalent to the emission-intensity performance of <ul style="list-style-type: none"> • “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 • <i>Additional requirements for coal-fired facilities coming on line in 2012 or later</i>
Petroleum Refining, Chemicals and Fertilizers	<ul style="list-style-type: none"> • Process-specific cleaner fuel standard <ul style="list-style-type: none"> • Based on natural gas • Incentive for carbon capture ready until 2018
Upstream oil & gas, Natural gas pipelines, Potash	<ul style="list-style-type: none"> • Process-specific cleaner fuel standard <ul style="list-style-type: none"> • Based on natural gas
Iron ore pelletizing, Lime, Iron and steel, Titanium, Pulp and paper, Aluminum and alumina, Cement, Base metal smelters	<ul style="list-style-type: none"> • Process-specific technology





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Strengthening the Framework: Oil Sands and Electricity



Strengthening the cleaner fuel standard in the oil sands sector achieves greater emission reductions

- Cleaner fuel standard will be set to be equivalent to carbon capture and storage for all new upgraders and in-situ plants
 - This will apply to facilities coming on stream in 2012 or after
 - This requirement will come into force in 2018
 - Our preliminary estimates – to be validated in the coming months - are that approximately 70% of CO₂ emissions of upgraders and 50% of in-situ plants could be captured
- If the oil sands industry implements carbon capture and storage, the infrastructure could also be used by other industries located in the area (refineries, chemicals, fertilizer)



Implications of cleaner fuel standard for upgraders and in-situ oil sands plants

TOUGH	TOUGHER	TOUGHEST
Existing facilities Starting in 2010	New facilities Starting in 2004 to 2011	New facilities Starting in 2012 or later
<ul style="list-style-type: none"> Mandatory reductions becoming tougher every year (18%/ 2%) 	<ul style="list-style-type: none"> Cleaner fuel standard based on natural gas; standard suspended until 2018 if built capture-ready 3-year commissioning period + 2% continuous improvement 	<ul style="list-style-type: none"> <u>From 2012 to 2017:</u> Cleaner fuel standard based on natural gas; standard suspended until 2018 if built capture-ready <u>From 2018 on:</u> Cleaner fuel Standard based on carbon capture and storage technology
	<ul style="list-style-type: none"> All facilities currently under construction, approved, or at late planning stage would meet the standard 	<ul style="list-style-type: none"> All upgraders that have been through approval process would meet the standard
		<ul style="list-style-type: none"> 7 in-situ plants that have been through approval process are not being designed capture ready
		<ul style="list-style-type: none"> Those under discussion have time to adjust their design

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



Strengthening the cleaner fuel standard in the electricity sector achieves greater emission reductions

- Cleaner fuel standard will be set to be equivalent to carbon capture and storage on new coal-fired electricity plants
 - This will apply to facilities coming on stream in 2012 or after
 - This requirement will come into force in 2018
 - Our preliminary estimate – to be validated in the coming months - is that approximately 75% of CO₂ emissions of coal-fired plants could be captured



Implications of cleaner fuel standard for coal-fired power plants

TOUGH	TOUGHER	TOUGHEST
Existing facilities	New facilities, starting in 2004 to 2011	New facilities, starting in 2012 or later
<ul style="list-style-type: none"> Mandatory reductions becoming tougher every year (18%/ 2%) 	<ul style="list-style-type: none"> Cleaner fuel standard equivalent to the emission-intensity of "supercritical" technology for coal-fired generation; standard suspended until 2018 if built capture-ready 3-year commissioning period + 2% continuous improvement 	<ul style="list-style-type: none"> <u>From 2012 to 2017</u>: Cleaner fuel standard equivalent to the emission-intensity of "supercritical" technology; standard suspended until 2018 if built capture-ready <u>From 2018 on</u>: Cleaner fuel standard equivalent to the emission-intensity of "Integrated Gasification and Combined Cycle with carbon capture and storage" technology
	<ul style="list-style-type: none"> All facilities operating or under construction meet the standard 	<ul style="list-style-type: none"> All facilities in planning stage, but not yet approved, would meet the standard

Green: in conformity with proposed targets



Target structure by sector and type of facility

	TOUGH	TOUGHER	TOUGHEST
Sector	Existing facilities 18/2 from 2010	New facilities On stream 2004 or later 3-year commissioning period 2% continuous improvement	Additional requirements for new facilities On stream 2012 or later
Oil Sands	As above	Process-specific cleaner fuel standards for mining, in situ, and upgrading <ul style="list-style-type: none"> • based on natural gas • incentive for carbon capture and storage until 2018 	Target based on carbon capture and storage for in situ and upgrading <ul style="list-style-type: none"> • effective 2018
Electricity	As above	Fuel-specific cleaner fuel standard for coal, gas, and oil <ul style="list-style-type: none"> • Incentive for carbon capture and storage until 2018 	Target based on carbon capture and storage for coal <ul style="list-style-type: none"> • effective 2018
Petroleum refining, Chemicals and fertilizers	As above	Process-specific cleaner fuel standards <ul style="list-style-type: none"> • based on natural gas • incentive for carbon capture and storage until 2018 	
Upstream oil and gas, Natural gas pipelines, Potash	As above	Process-specific cleaner fuel standard <ul style="list-style-type: none"> • based on natural gas 	
Iron ore pelletizing, Lime, Iron and steel, Titanium, Pulp and paper, Aluminum and alumina, Cement, Base metal smelters	As above	Process-specific technology	



Clean electricity could deliver an additional 25 Mt of reductions

- The government will convene a task force to work with provinces and utilities with a goal of designing a path to reduce an additional 25 Mt by 2020 through a combination of new nuclear, new hydro, and other renewables linked by a national grid
- Actions could include:
 - East-West Grid
 - Development of more hydroelectric projects
 - New nuclear reactors
 - Retirement of fossil-fuel plants at the end of their expected life recognizing that it would also substantially reduce air pollutants
- The expected reductions would be in addition to those imposed by the regulatory framework





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Regulatory Framework – Final compliance mechanisms



Technology Fund

- Firms may contribute to a technology fund as a means of compliance for the 2010-2017 period, subject to limits
 - As percent of total regulatory obligation: 70%, 65%, 60%, 55%, 50%, 40%, 10%, 10%
 - Contribution rate in \$/tonne: \$15, \$15, \$15, \$20, \$20 escalating with GDP
- A further 5 Mt/year of credits will be available through the research and development component
- Technology fund will take a portfolio approach to investment in a range of deployment and development projects
- Fund will seek ownership of resulting emission reductions based on project cost



Maximizing the use of the pre-certified investments will facilitate the uptake of carbon capture and storage

- Firm will be eligible to receive credits for investing directly in large-scale and transformative projects, either its own or joint-venture projects, selected by the firm from a menu set out by the federal government
- Eligible firms may contribute up to 100% of their regulatory obligation in pre-certified investments in carbon capture and storage projects
 - Eligibility limited to firms that can make direct use of the technology in the following sectors: oil sands, electricity, chemicals, fertilizers, and petroleum refining



Offset System

- Credits will be issued for incremental real, verified domestic reductions or removals of greenhouse gas emissions in activities outside the regulations
- Only emission reductions or removals that take place after January 1, 2008 may generate credits
 - And only projects that began to achieve reductions after January 1, 2000 will be eligible
- The Offset System has been launched
 - Companion document on the design of the Offset System has been released
- Guide for protocol developers will be published this spring, with guide for project proponents and verification bodies following in summer
- Government will begin reviewing project applications in the fall



Credit for Early Action and the Clean Development Mechanism

- Credit for Early Action Program
 - Firms that took verified early action to reduce emissions will be eligible for a one-time allocation of 15 Mt in credits
 - 5 Mt credits issued in each of the years 2010, 2011, and 2012
 - Reductions must have been achieved between 1992 and 2006 and be the result of an incremental process change or facility improvement
 - Companion document has been released for public comment until May
 - Phase 1 submissions will be accepted until late June
 - Allocation decisions will be made by summer 2009
- Clean Development Mechanism
 - Firms may use credits from the Kyoto Protocol's Clean Development Mechanism – with the exception of credits from forest sink projects – for up to 10% of their regulatory obligation





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Implications



Regulatory framework is expected to deliver significant emission reductions

- Regulatory framework is expected to achieve approximately 165 Mt in direct and indirect emission reductions from the industrial sector by 2020
 - An estimated 37% reduction from projected levels
 - An estimated 21% reduction below 2006 levels
- This does not include the additional 25 Mt in targeted reductions from the electricity sector



Overall economic impacts of regulatory framework

- Short-term costs post-2010 for regulated industries will be marginal, as compliance mechanisms provide relatively low-cost options for first five years or so
- Long-term economic costs of the regulatory package are manageable - economic impacts are estimated not to exceed 0.5% of forecasted real GDP levels in any given year between 2010 and 2020
- The long-term economic impact varies across regions, with Alberta and Saskatchewan, followed by Nova Scotia and New Brunswick, most affected, and Manitoba and Quebec least affected
- The framework will provide regulatory certainty to industry and allow long-term planning with much greater confidence



Estimated Emissions Impact by Sector based on the Modelling

Covered Industrial Sectors	2006 Covered Emissions		2020 Projected Emissions		2020 Emissions Post-regulations	
	Mt CO ₂ e	%	Mt CO ₂ e	%	Mt CO ₂ e	%
TOTAL	356	100%	427	100%	299	100%
Oil Sands	29	8%	108	25%	49	17%
Electricity	123	35%	122	29%	89	30%
Petroleum Refining	23	7%	32	8%	20	7%
Chemicals	9	2%	12	3%	8	3%
Fertilizers	8	2%	9	2%	7	2%
Upstream Oil & Gas	94	26%	68	16%	57	19%
Natural Gas Pipelines	15	4%	14	3%	13	4%
Potash	1	0%	1	0%	1	0%
Iron Ore Pelletizing	2	1%	4	1%	3	1%
Lime	3	1%	4	1%	3	1%
Iron, Steel & Titanium	13	4%	19	5%	18	6%
Pulp & Paper	7	2%	5	1%	4	1%
Aluminium & Alumina	13	4%	13	3%	11	4%
Cement	13	4%	14	3%	13	4%
Base Metal Smelting	4	1%	3	1%	3	1%
Total reductions from projected emissions by 2020					125 Mt (29%)	

1. Numbers may not added-up due to rounding
2. The industrial regulations will also yield additional indirect reductions from investments made by the Technology Fund and actions taken to reduce unintentional fugitive emissions from various sectors – together estimated to generate another 40 Mt by 2020



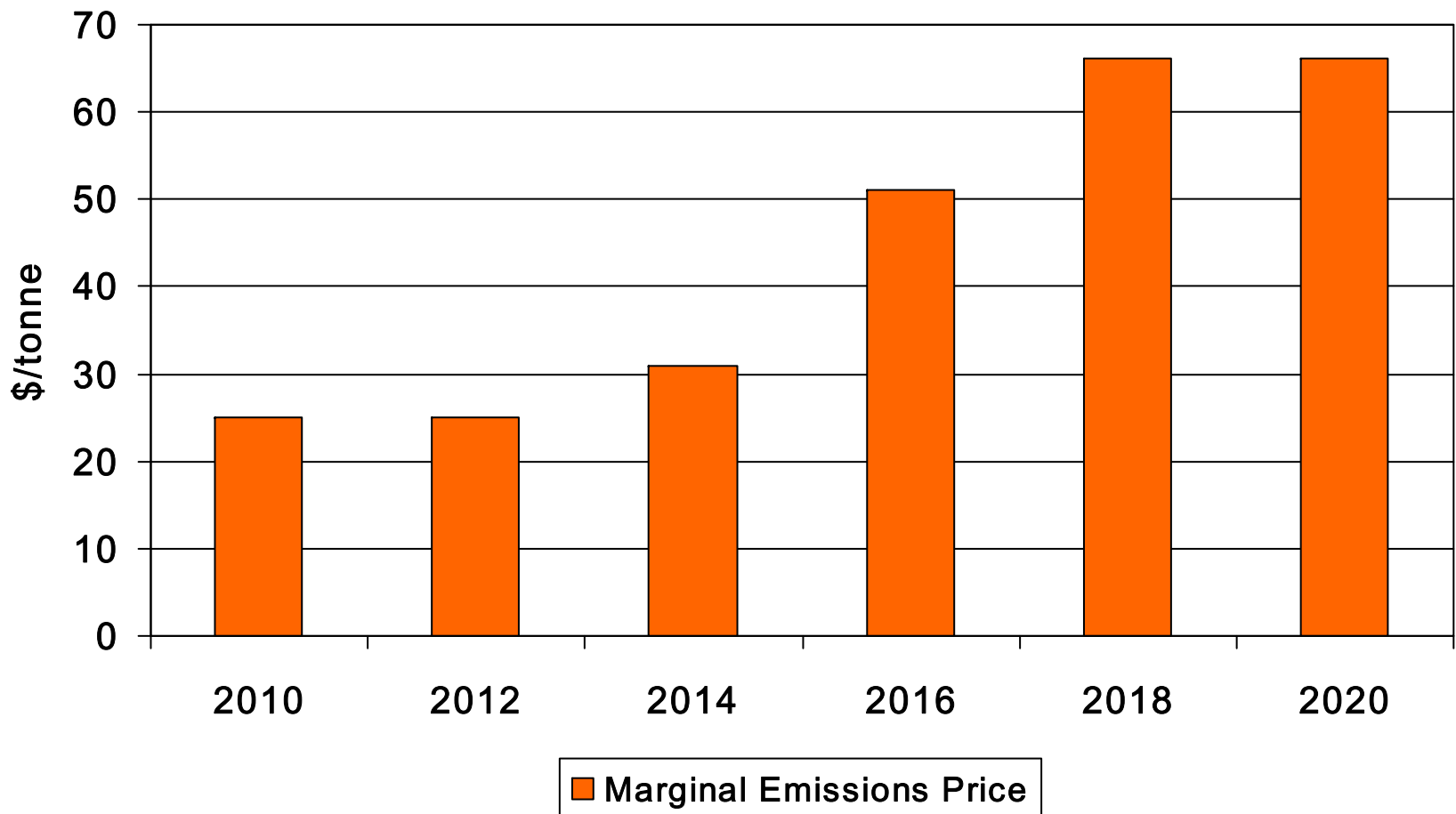
Estimated Emissions Impact by Province based on the Modelling

Province or Territory	2006 Industrial Emissions		2020 Projected Industrial Emissions		2020 Industrial Emissions Post-regulations	
	Mt CO ₂ e	%	Mt CO ₂ e	%	Mt CO ₂ e	%
TOTAL	356	100%	427	100%	299	100%
Alberta	175	49%	237	55%	142	48%
British Columbia	16	5%	16	4%	13	4%
Manitoba	3	1%	3	1%	3	1%
New Brunswick	12	3%	14	3%	10	3%
Newfoundland & Labrador	6	2%	9	2%	6	2%
Northwest Territories	1	0%	5	1%	4	1%
Nova Scotia	13	4%	13	3%	9	3%
Nunavut	0	0%	0	0%	0	0%
Ontario	65	18%	67	16%	64	21%
Prince Edward Island	0	0%	0	0%	0	0%
Quebec	26	7%	30	7%	25	8%
Saskatchewan	38	11%	33	8%	24	8%
Yukon	0	0%	0	0%	0	0%
Total reductions from projected industrial emissions by 2020					125 Mt (29%)	

1. Numbers may not added-up due to rounding
2. The industrial regulations will also yield additional indirect reductions from investments made by the Technology Fund and actions taken to reduce unintentional fugitive emissions from various sectors – together estimated to generate another 40 Mt by 2020



The price of credits on Canada's carbon market is expected to hit \$65/tonne by 2018





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Path forward



Next steps

- Draft regulations are expected to be published in *Canada Gazette, Part I* for public comment in fall 2008
- Final regulations are expected to be approved and published in *Canada Gazette, Part II* in fall 2009
- Greenhouse gas provisions of the regulations are to come into force, as planned, on January 1, 2010
- Air pollutant elements will be added to the draft regulations once the regulatory framework for air pollutants has been finalized in spring 2008

