CPANS Edmonton Luncheon

Area Fugitive Greenhouse Gases Emissions Estimation in the Oil Sands

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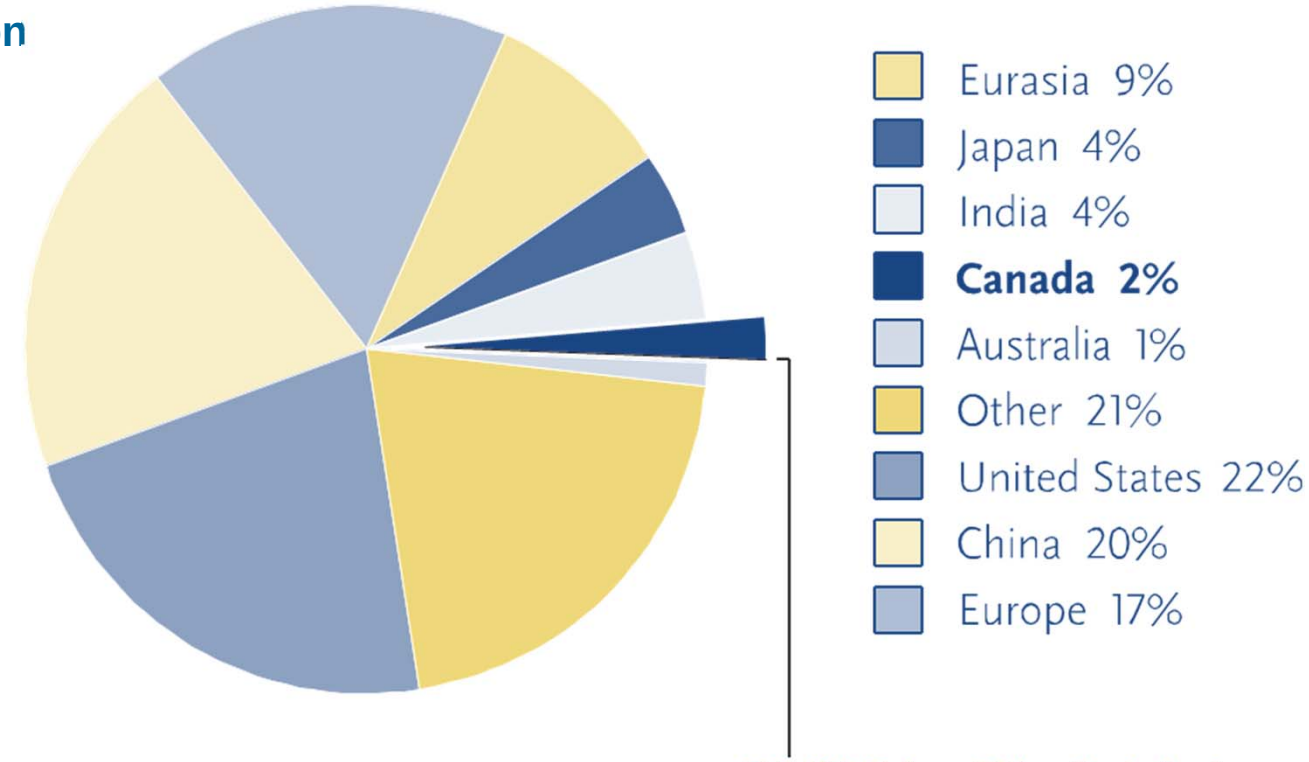
Oil sands and GHGs globally

The oil sands in a carbon constrained world…



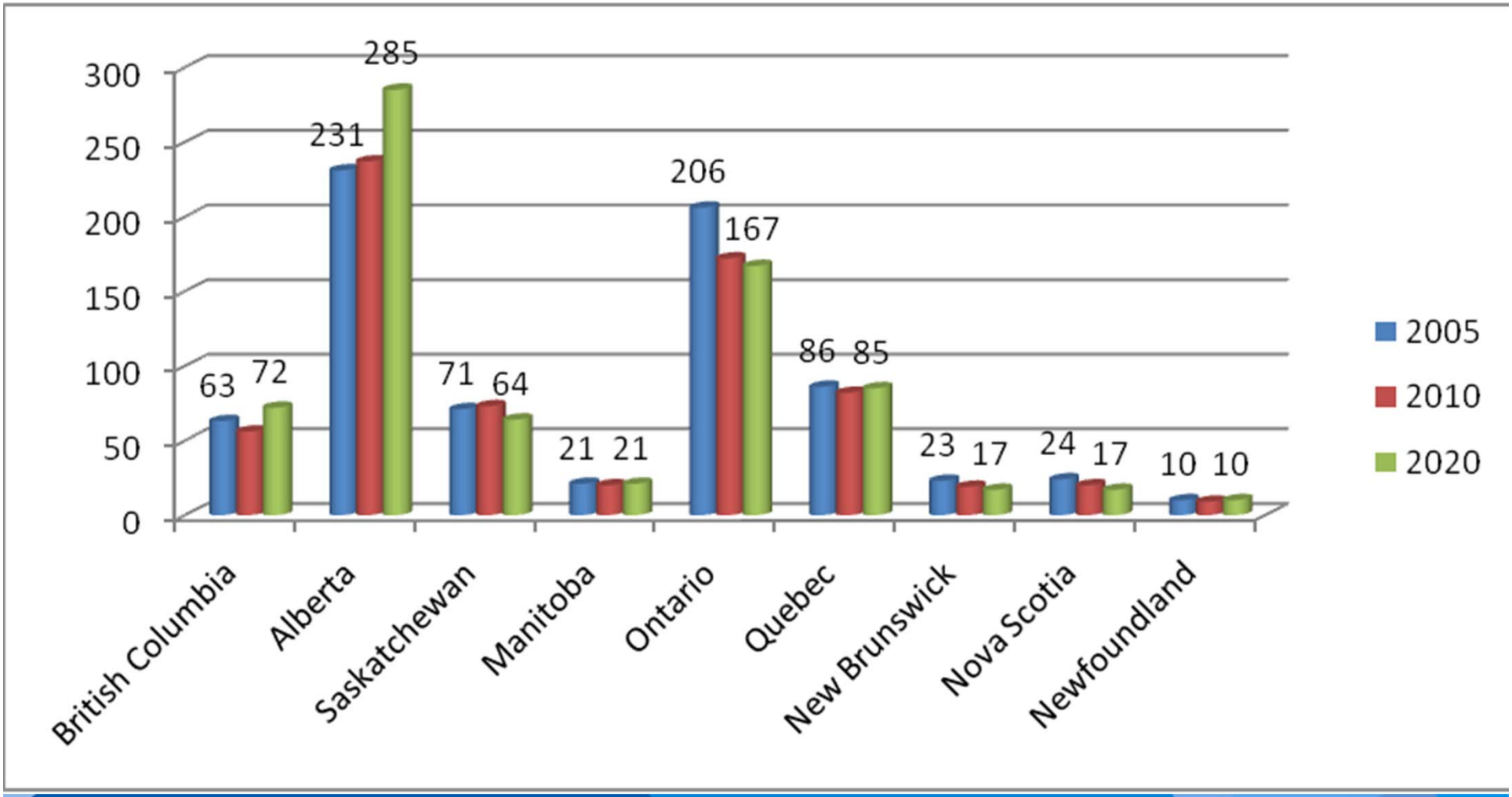
OIL SANDS = 0.15% of global GHG emissions

Oil sands carbon intensity is decreasing, while the carbon intensity of 'conventional' sources is going up

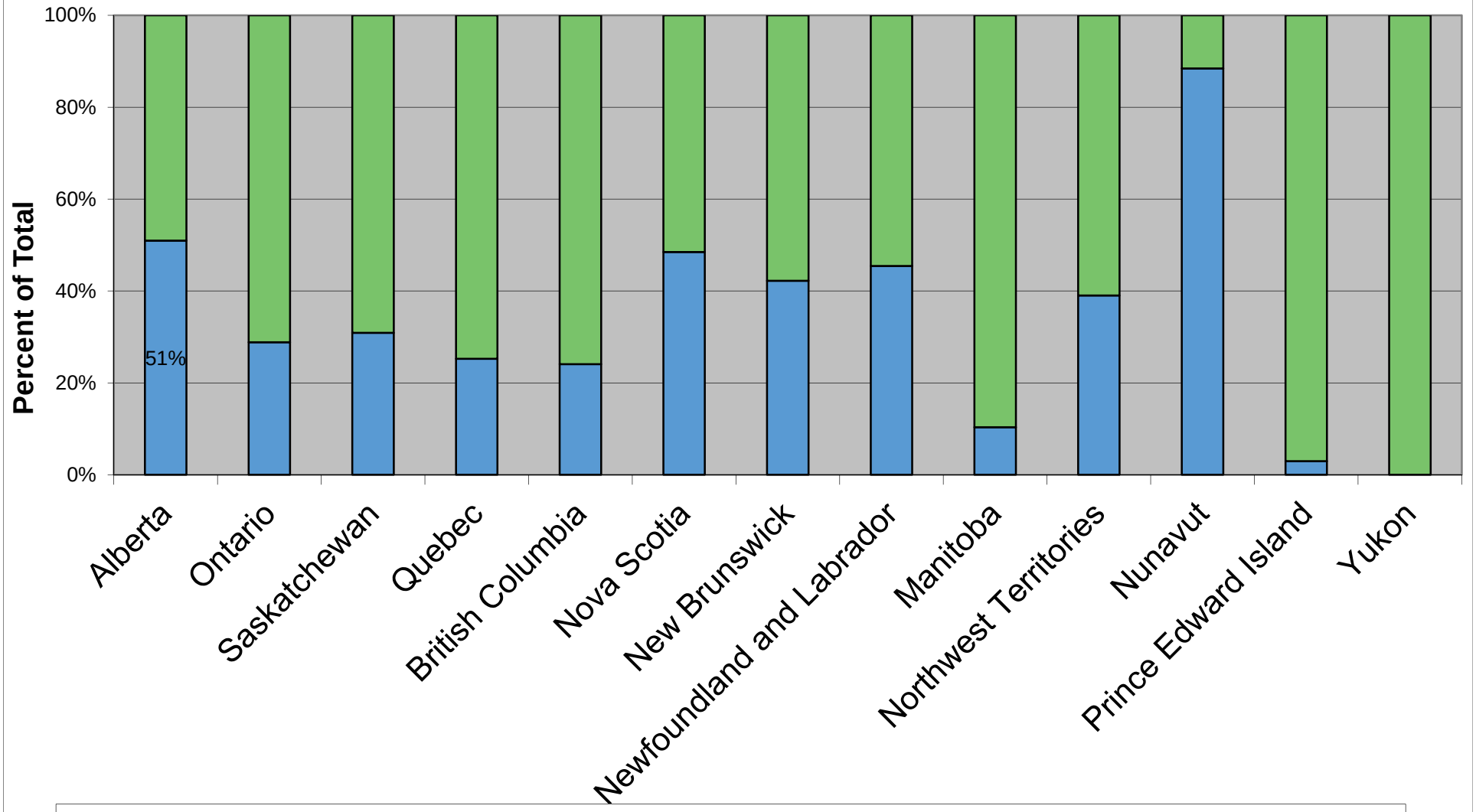
CANADA = 2% of global GHG emissions

The challenge:
as production increases, so do total emissions

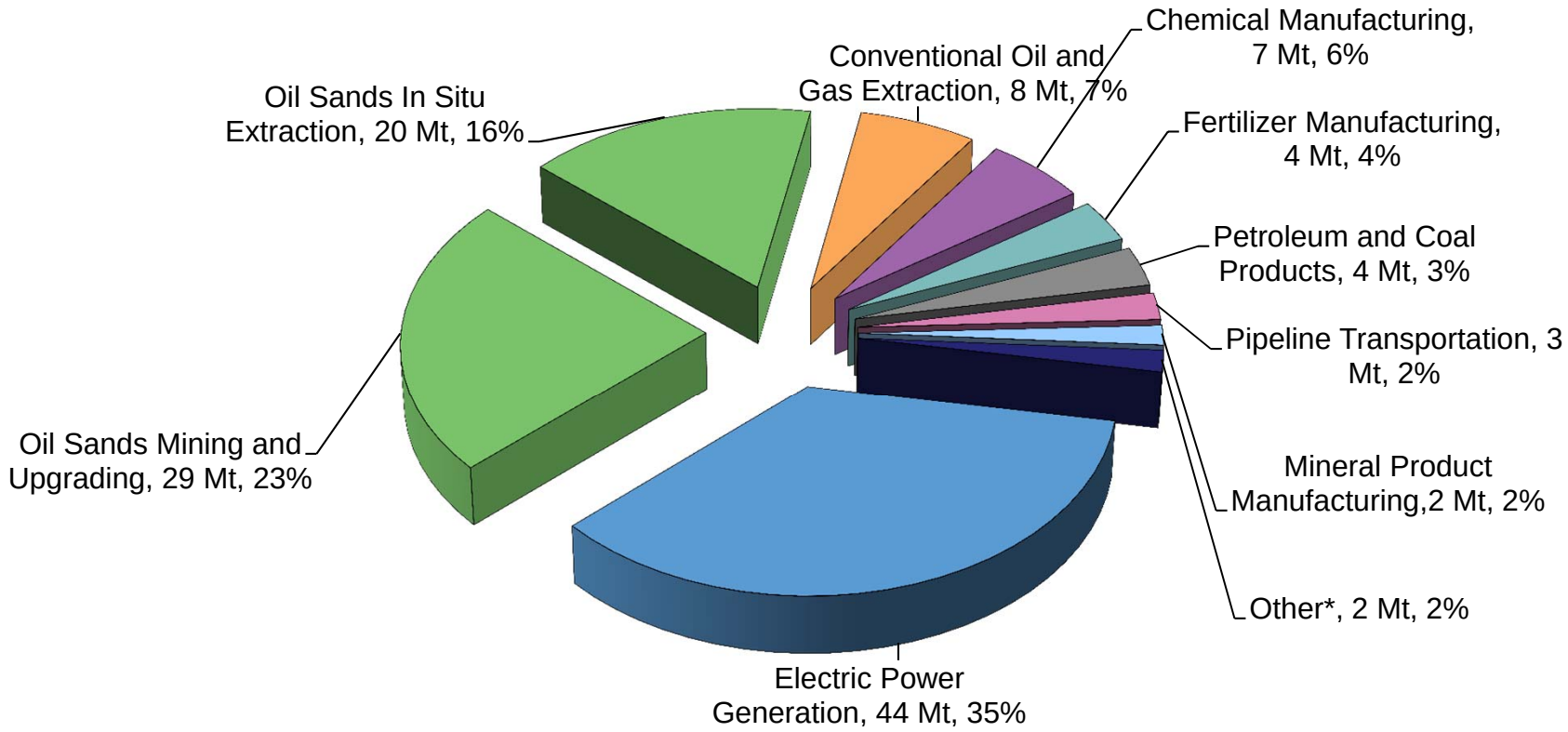
GHG Emissions across Canada



Reported 2011 Faciltiy GHG Emissions as Portion of Total Provincial/Territorial Emissions



Contribution of 2011 Total Reported Greenhouse Gas Emissions by Industrial Sector in Alberta



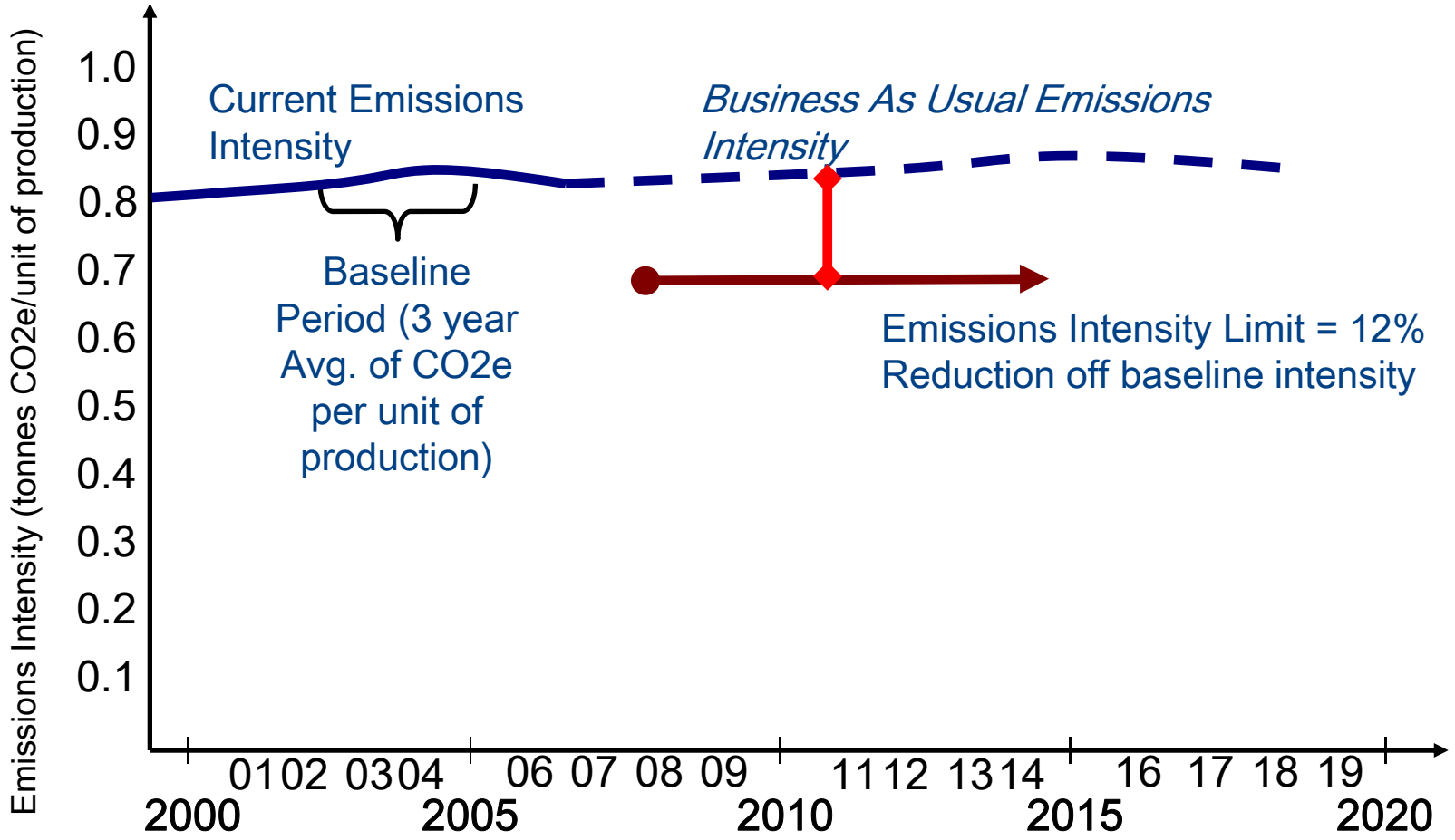
Large Emitting Facilities – (>50,000 tonnes CO2e)

Regulated Emitters = 115 Mt CO_2e >70% of total Industrial Emissions, >50% total Provincial emissions (242 Mt CO_2e)

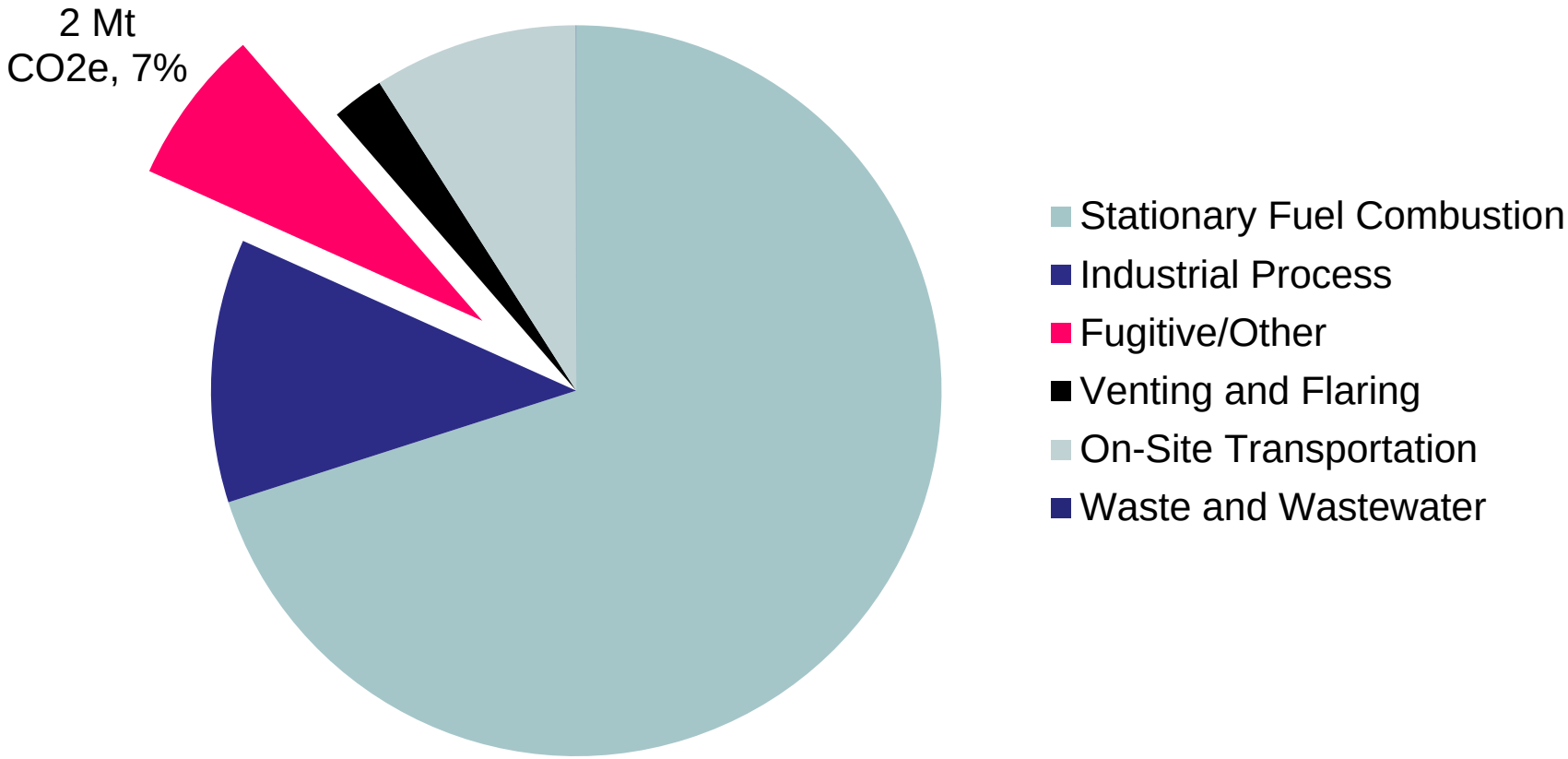
Specified Gas Emitters Regulation

- Came into force in 2007
- Applies to all facilities in Alberta that produce over 100,000 tonnes of CO_2E
  - About 100 facilities that represent 50% of Alberta's overall emissions or 70% of industrial emissions
- Requires facilities to establish a historic baseline intensity
  - Based on average emissions intensity from 2003-2005 (emissions/production = baseline intensity)
  - 3^{rd}-5^{th} year average for new facilities
- Intensity limits applied – reductions relative to baseline intensity
  - Existing facilities - required to reduce their intensity by 12% from their baseline
  - New Facilities - phase-in of target for new facilities

Target Example – Existing Facility



Oil Sands Mining and Upgrading (2011)



2011 Tailings and fugitive Emissions

	CH4 Emissions (t CO2e/y)	CO2 Emissions (t/y)	total GHG (t CO2e)	MMbbl bitumen produced	kg CO2e/ bbl bitumen	Diluent loss (m3 ERCB)	kg CO2e/m3 diluent lost
Suncor Mines and Upgraders							
Total emissions from ponds	122,078	164,948	287,026	105	2.7	64,036	4,482
Total fugitive emissions	142,143	167,810	309,953	105	3.0	64,036	4,840
Syncrude Mildred Lake and Aurora Mines and Upgrader							
Total emissions from ponds	562,866	224,500	787,366	127	6.2	74,184	10,614
Total fugitive emissions	886,680	305,573	1,192,254	127	9.4	74,184	16,072
Shell Muskeg River and JackPine Mine							
Total emissions from ponds	6,754	32,862	39,616	77	0.5	39,793	996
Total fugitive emissions	52,205	127,243	179,448	77	2.3	39,793	4,510
All SGER mines							
Total emissions from ponds	691,697	422,310	1,114,008	308	3.6	178,013	6,258
Total fugitive emissions	1,081,028	600,627	1,681,655	308	5.5	178,013	9,447

Quantification Challenges

- Large surface areas (>60 km^2 ponds, >30 km^2 mines)
- Surrounded by other sources
- Dangerous (active mine sites, H2S, etc)
- Difficult to sample in some weather conditions
- Temporal and spatial variability

Current Sample Method

- EPA flux Chamber Method
- 1 m^2
- Each sample takes ~30 min
- Gas composition obtained from lab

Regulatory Challenges

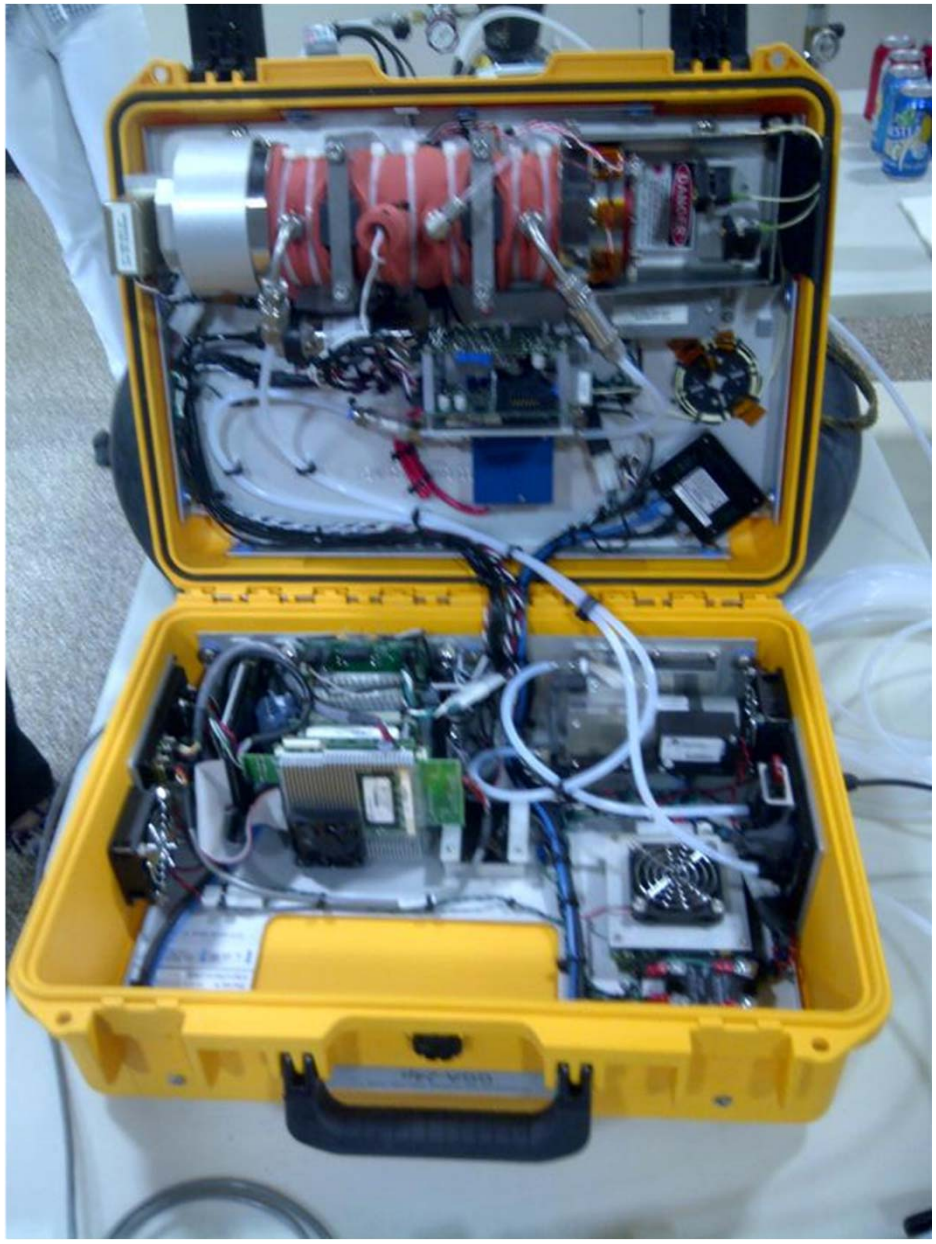
- Historical baseline
- Incentive to reduce emissions – lag between action and emissions
- Uncertainty on overall inventory and regulatory system (auditor general)
- Limited practitioner expertise and experience
- Variable level of effort to date (frequency and coverage of sampling)

Approach

- Standardized guidance for flux chamber quantification:
  - Frequency/Coverage specified
  - Prioritized sampling by emissions levels and variability
  - Standard assumptions
- Exploration of Other Options
  - Supporting Academic Research – monitoring options and understanding underlying science
  - Industry Options – consultant and facility led

Pond Sample Density

- three locations per zone or one location per 400,000 m2 (40 hectares), whichever is greater
- Compute standard error on average fluxes in CO2e for each zone
- Compute expected additional number of samples required based on standard error
- up to maximum total sample requirement of 1 sample location per 4 hectares)

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Summary

- Area fugitive emissions represent an area of significant uncertainty in emissions inventories
- All options are under consideration to address the challenge
- The specific regulatory context matters
- Ideally will link to management actions
- First step is to standardize guidance for current method
- Improve data while exploring other alternatives

Questions?

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