

Energy and the Environment

AUMA President's Summit

Jesse Row

Sustainable Communities Group

May 11, 2011



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About Pembina

The Pembina Institute is a *Sustainable Energy Think Tank* with the goal of:

“advancing sustainable energy solutions through research, education, consulting and advocacy.”

- Climate Change
- Oilsands
- Renewable Energy
- Energy Efficiency
- Corporate Consulting
- Green Economics
- Municipalities and First Nations
- GreenLearning

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Offices:

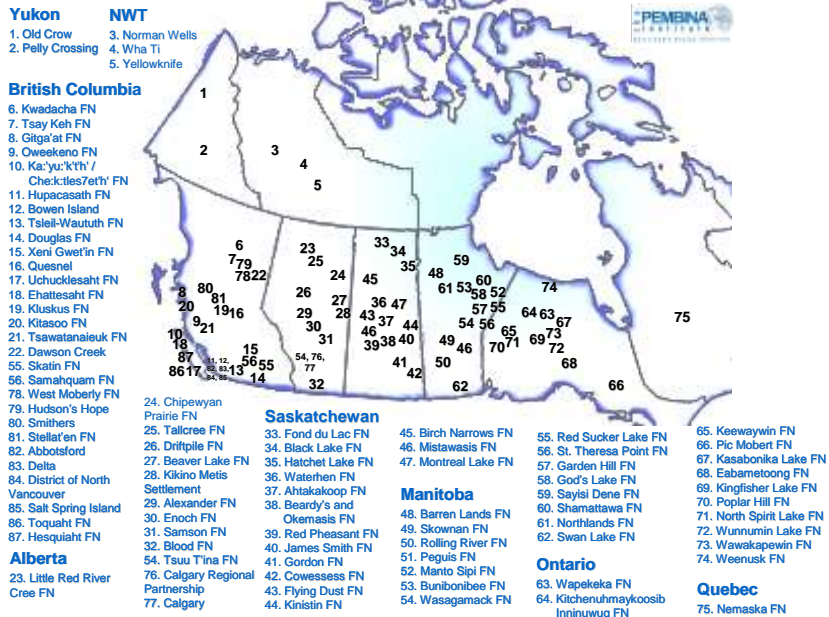
Gatineau	Toronto	Calgary
Canmore	Drayton Valley	Edmonton
Vancouver	Yellowknife	

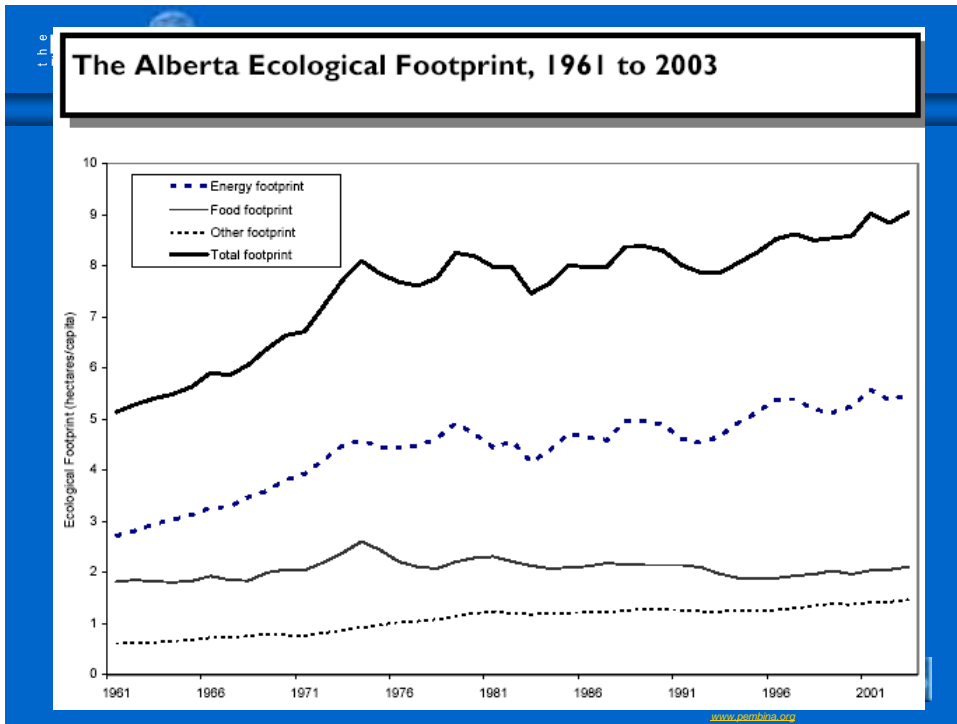
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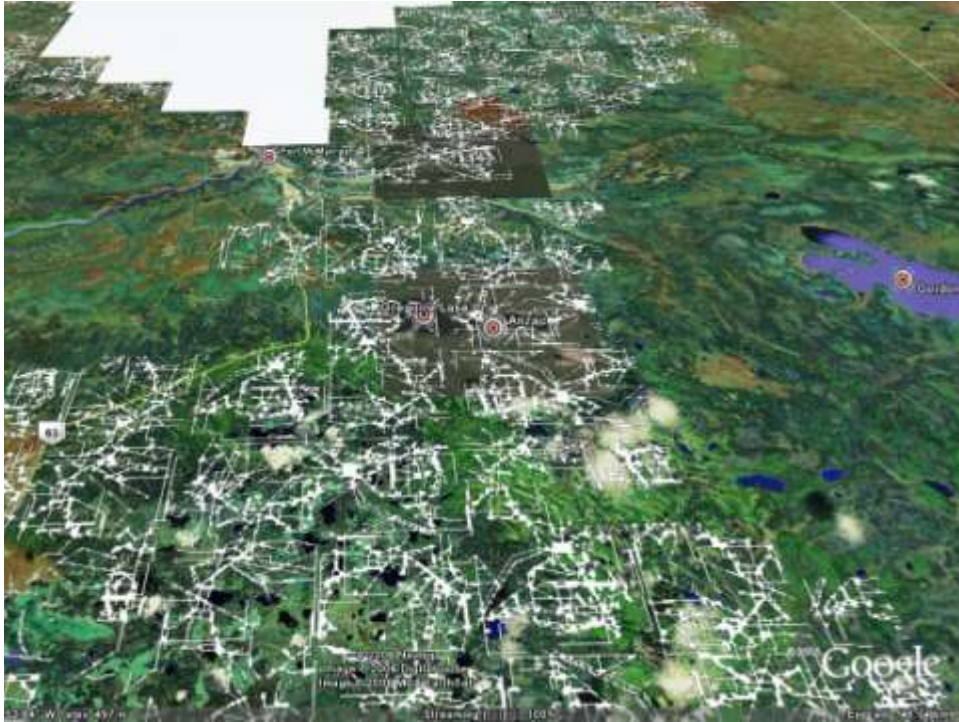
Updated Feb 26, 2009





**Underlies ~149,000 km² of boreal forest
= 23% of Alberta**

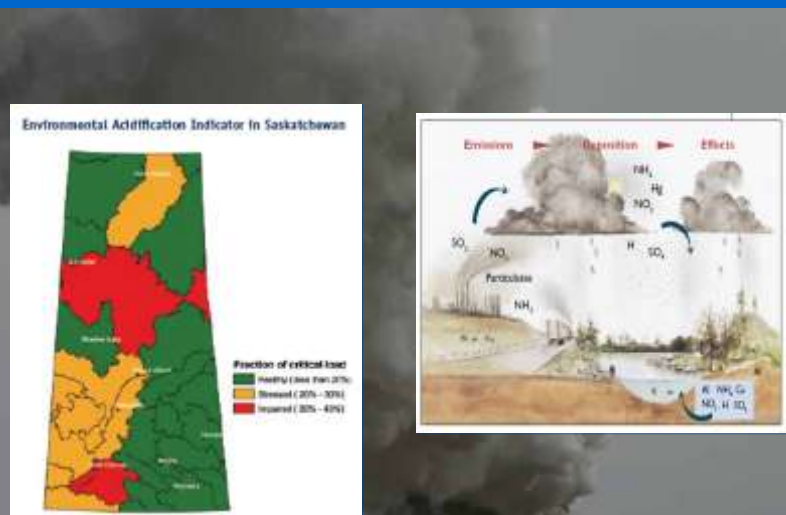
Alberta is home to nearly all of Canada's oil sands



Tailings Ponds

- Tailings ponds contain process affected waters with unrecovered hydrocarbons
- Acute & chronic toxicity
- Source of methane emissions

Acidifying Emissions



Projected Impacts of Climate Change

		Global Temperature Change (relative to pre-industrial)					
		0 C	1 C	2 C	3 C	4 C	5 C
Food		<i>Falling crop yields in many areas</i>					
		<i>Possible rising crop yields in some high latitude areas</i>					
Water		<i>Water supplies threatened in several areas</i>		<i>Significant decreases in water availability in many areas</i>		<i>Sea level rise threatens major cities</i>	
		<i>Extensive damage to coral reefs</i>		<i>Rising numbers of species face extinction</i>			
Extreme Weather Events		<i>Rising intensity of storms, forest fires, droughts, flooding and heat waves</i>					
Risk of Major Changes		<i>Increasing risk of dangerous feedbacks and abrupt, large-scale shifts in the climate system</i>					

For Alberta, this could mean...



**...increased
droughts,
heat waves,
storms,
floods,
tornadoes**

This could mean...



**...more
forest fires
and insect
outbreaks**

This could mean...



**...changes
in water
quality and
quantity**

This could mean...



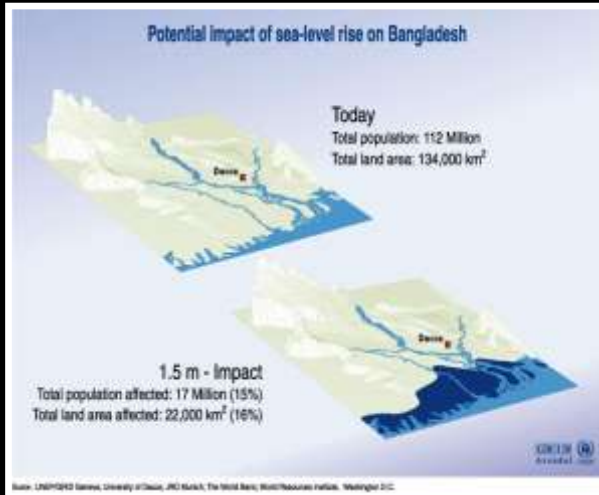
**...loss of
native
species and
biodiversity**

This could mean...



**...decline in
local air
quality**

This could mean...



...rising sea levels

This could mean...



...forced migration and humanitarian crises

This could mean...



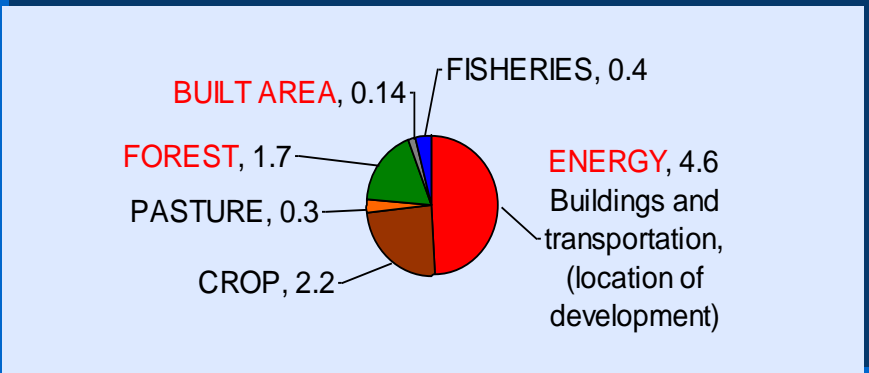
**...increased
conflict**

This could mean...



**...productivity
and trade
disruptions**

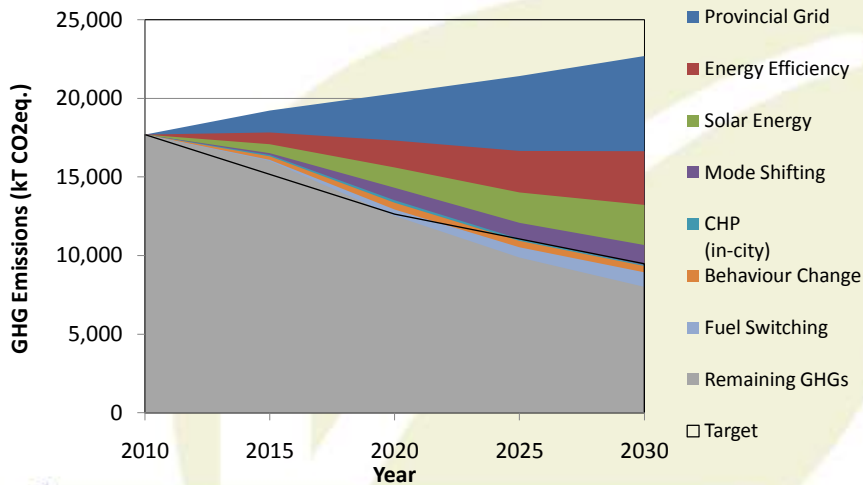
Ecological Footprint



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Solutions



Cost Competitiveness

Cost Competitiveness	Option
Reduces Overall Costs	Energy Efficiency Transit, Walking and Cycling Idle Reduction Technologies Passive Solar Energy
Cost Competitive	Large Scale Wind Power and Natural Gas Cogeneration
Range of Estimates	Solar Air and Water Heating Behaviour Change Natural Gas Vehicles
Currently More Expensive	Coal with CCS Nuclear Power Photovoltaics Biofuels



Protecting what's precious.
Land. Air. Water.

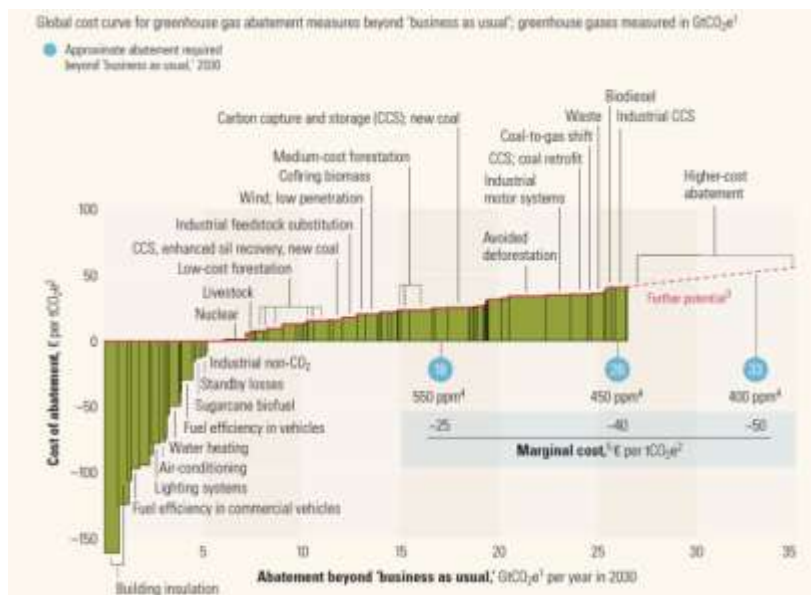


THE CITY OF
CALGARY

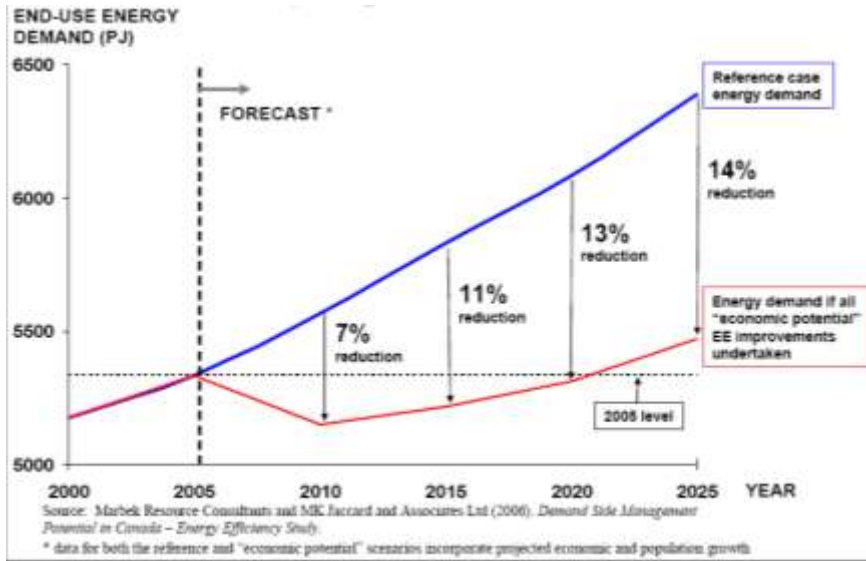


ALBERTA
Energy Efficiency Alliance

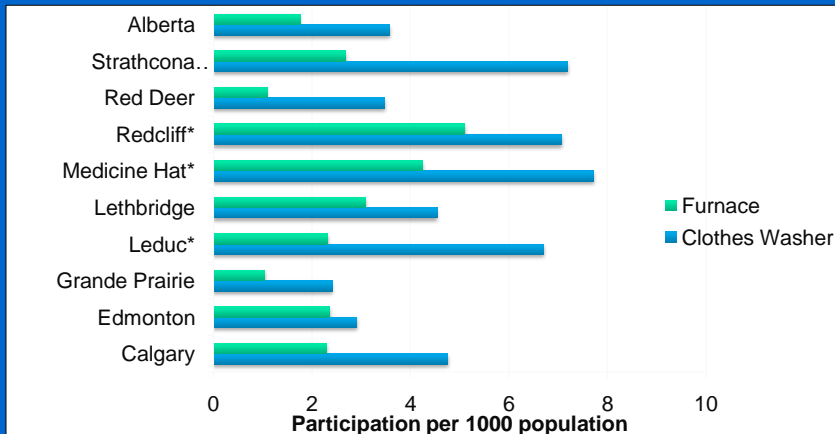
\$ 0 / tonne CO₂eq.



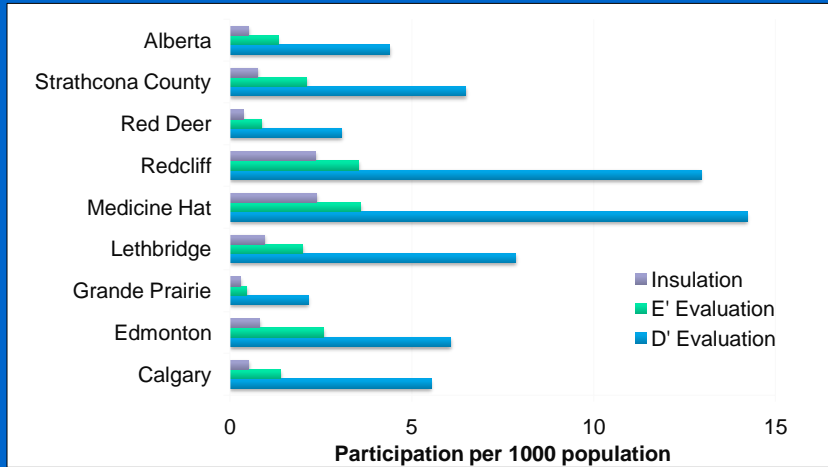
EE Potential



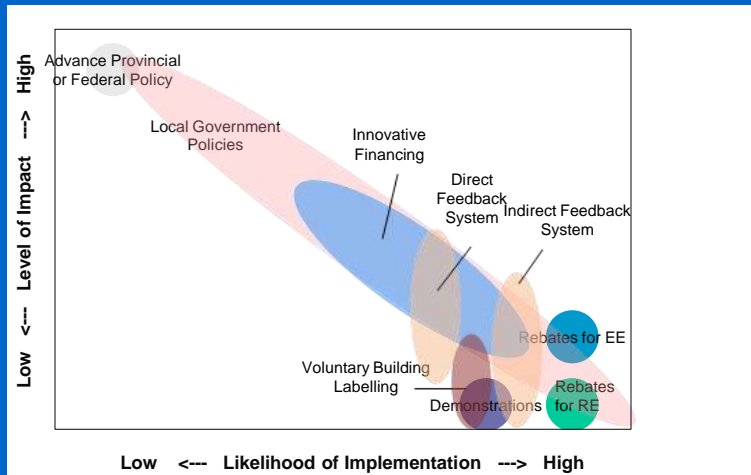
Rebate Programs



Rebate Programs



Options Matrix



Thank You



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Financing

- Original endowment provided in 1991: \$23 million
- Grants and loans provided by TAF since 1991: \$51 million
- City energy budget savings supported by TAF: \$55 million
- TAF average annual budget: \$1.9 million
- Average administrative costs: 19%
- Annual cost of TAF to City operating budget: \$0

Appliance Efficiencies

Average annual energy consumption of common household appliances by year of manufacture (kWh/year)

