



PETERS AND CO
Winter Energy Conference

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SilverBirch
ENERGY

OIL SANDS: IS IT THAT DIRTY?

A Perspective on Tailings

- Oil Sands Mines have large footprint
 - 5,000 – 10,000 ha disturbance is not uncommon
 - Comparable to large coal or base metals mine
 - Active mining footprint is 662 km² (Toronto GTA is 7,125 km²)
 - Total oil sands area is 142,200 km²
 - Total Boreal Forest area is 3,200,000 km²
- What are the major concerns?
 - Pace of development
 - Land use, emissions, habitat destruction
 - Water consumption, contamination
 - Cumulative environmental effects, health concerns
 - Disruption of traditional land use



WHY DO WE HAVE TAILINGS PONDS?

- Mining activities create waste streams
 - Overburden – removed to expose oil sands, used in reclamation
 - Tailings – mixture of water, clay, sand and residual bitumen (+naphthenic acids)
 - Process affected water – cleaned and re-cycled, will be eventually released under stringent conditions (none to date).
 - Water seepage from ponds – collected and re-cycled
 - Air emissions from process operations, fugitive dust



Recent Tailings Dam Failure In Hungary



WHY DO WE HAVE TAILINGS PONDS?

- Why do tailings ponds attract attention?
 - Containment failure can cause severe impacts
 - Toxicity of process by-products in tailings
 - Industry and Government perceived by Public to ignore the issue
 - Comprehensive regulatory approach makes catastrophic failure in Alberta unlikely (Dam Safety, ERCB, OH&S, GRB)



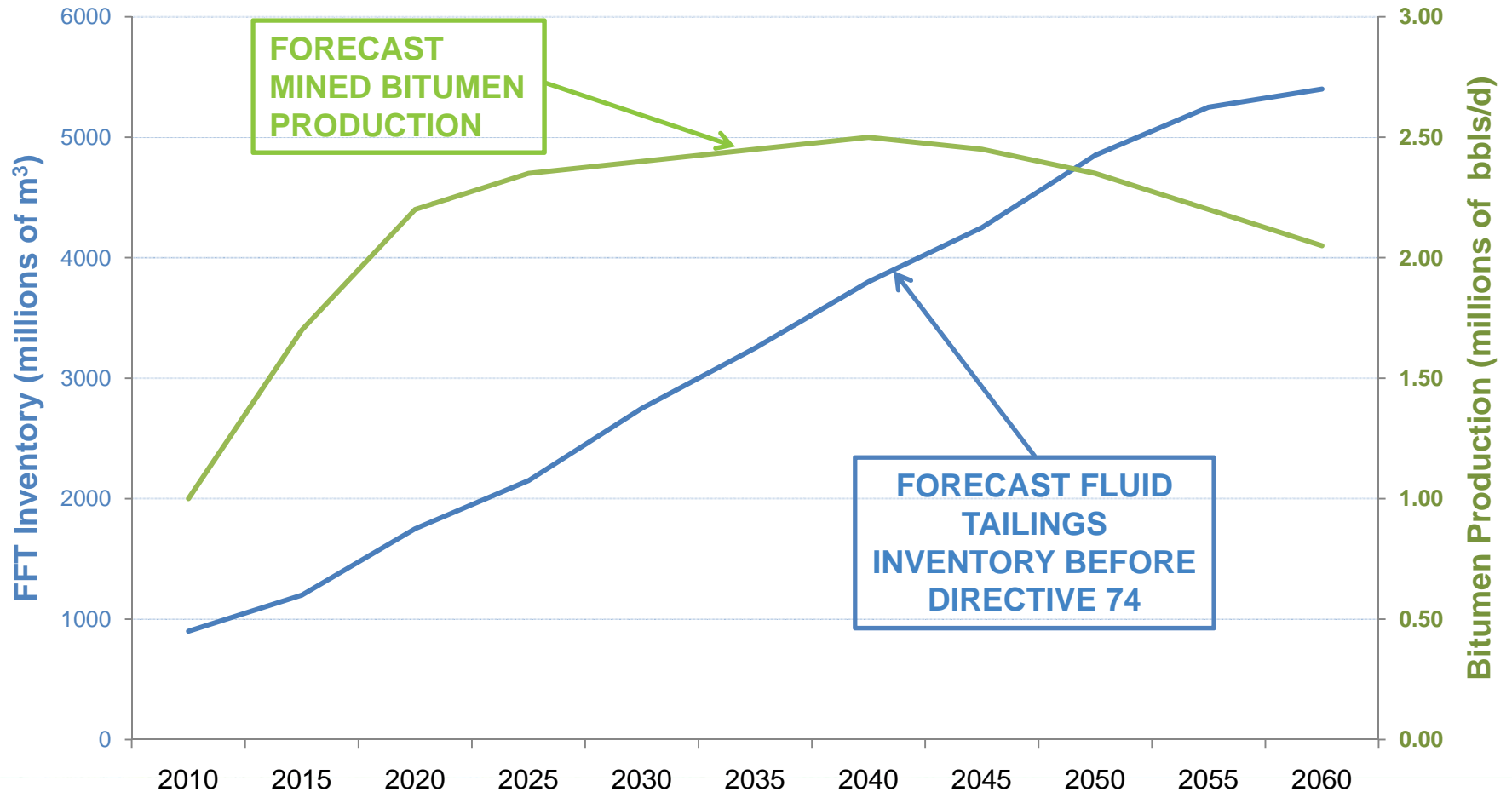
TAILINGS: KEY CONCERNS

- Volumes of Fluid Tailings
- Footprint of Tailings Deposits
- Water Use, Re-Cycle and Return to the Environment
- Tailings Reclamation
- Use of Technology and Innovation
- Health Effects
- Wildlife Impacts
 - Improved water foul deterrent systems are being deployed
- Emissions and Odours



Fluid Fine Tailings Inventory Projections

— FLUID FINE TAILINGS INVENTORY Millions of Cubic Metres (LHS)
 — BITUMEN PRODUCTION Million of Barrels per day (RHS)



GOVERNMENT RESPONSE

Recognition of the role of fluid tailings – need to reduce inventory and accelerate reclamation

- ERCB Tailings Directive (Directive 74, February 2009)
 - Performance criteria for the reduction of fluid tailings
 - Formation of trafficable deposits
 - Active inspection and enforcement
- Tailings Management Framework (Work In Progress)
 - Initiative of Alberta Environment
 - An integrated management approach for reducing tailings inventory
 - Addresses long term environmental issues such as containment and reclamation



INDUSTRY RESPONSE

Recognition of public concern combined with implementation of developmental technologies

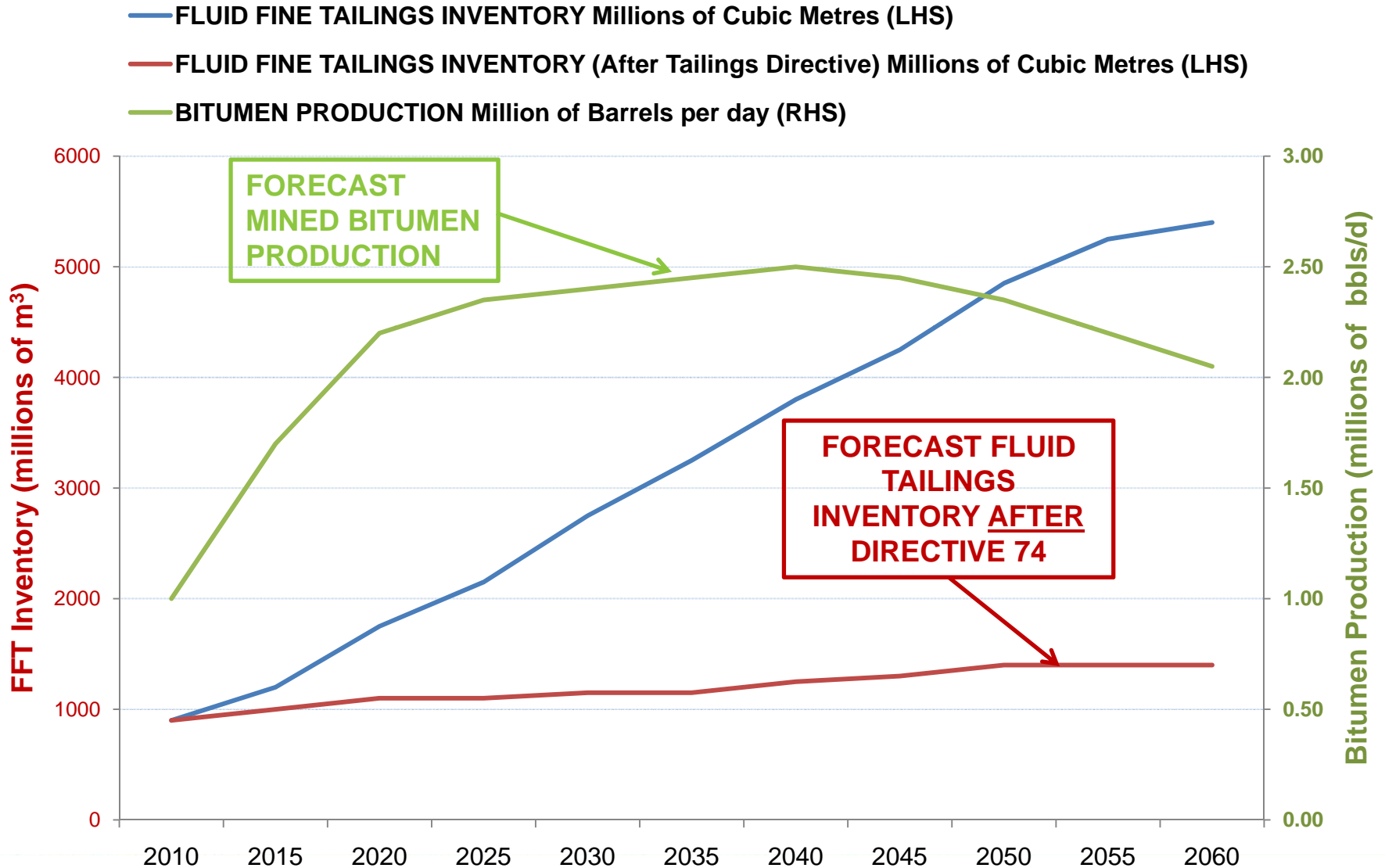
- Long term effort in tailings research
 - Multi Year, Research \$ intensive
 - All major players conducting research
 - Technologies maturing to demonstration level in past 2 years
- Dramatic reduction in projected Fluid Tailings inventory
- Various company announcements:
 - Suncor's "Tailings Reduction Operations (TRO)"
 - Shell's "Atmospheric Fines Drying (AFD)"
 - CNQ's "Mature fine tailings thin lift dewatering and non-segregated tailings"
 - All mine operators have revised tailings plans approved by ERCB to address Directive 74



SHELL'S “AFD” DRIED TAILINGS



Fluid Fine Tailings Inventory Projections



INNOVATION AND TECHNOLOGY

- **Alberta Govt. R&D** (See www.oilsands.alberta.ca)
 - The Government of Alberta is working with industry and researchers to develop new tailings performance criteria, management technologies and practical solutions to reduce and potentially eliminate tailings ponds as we know them today.
 - Alberta has allocated \$32 million to support clean energy research being driven by the University of Alberta, including \$7 million allocated specifically to support tailing research at the university's School of Energy and the Environment.
 - New technologies will also further reduce freshwater consumption associated with oil sands extraction.
 - Tailings management research has been underway for decades at the Alberta Research Council, the CANMET Energy Technology Centre and the University of Alberta, and in field trials by industry in the oil sands area.



INNOVATION AND TECHNOLOGY

Industry R&D

- Numerous individual company initiatives
- New tailings research consortium of 7 oil sands companies announced December 13th, 2010:

“Canadian Natural Resources, Imperial Oil, Shell Canada, Suncor Energy, Syncrude Canada Ltd., Teck Resources and Total E&P Canada announced today that they plan to work together in a unified effort to advance tailings management. The announcement reflects the companies' commitments to socially and environmentally responsible operations and responds to Alberta government policy to effect the timely reclamation of tailings.” (CNW Dec13,2010)



ROYAL SOCIETY OF CANADA REPORT

Independent Review of Oil Sands Operations (1)

- **Feasibility of Reclamation and Adequacy of Financial Security:**
“Reclamation is not keeping pace with the rate of land disturbance but research indicates that sustainable uplands reclamation is achievable and ultimately should be able to support traditional land uses. Current practices for obtaining financial security for reclamation liability leave Albertans vulnerable to major financial risk.”
- **Impacts of Oil Sands Contaminants on Downstream Residents:**
“There is currently no credible evidence of environmental contaminant exposures from oil sands reaching Fort Chipewyan at levels expected to cause elevated cancer rates. More monitoring focused on human contaminant exposures is needed to address First nations and community concerns.”



ROYAL SOCIETY OF CANADA REPORT

Independent Review of Oil Sands Operations (2)

- **Impacts on Regional Water Quality and Groundwater Quantity:**
“Current evidence on water quality impacts on the Athabasca River system suggests that oil sands development activities are not a current threat to aquatic ecosystem viability. However, there are valid concerns about the current Regional Aquatics Monitoring Program (RAMP) that must be addressed. The regional cumulative impact on groundwater quantity and quality has not been assessed.”
- **Tailings Pond Operation and Reclamation:**
“Technologies for improved tailings management are emerging but the rate of improvement has not prevented a growing inventory of tailings ponds. Reclamation and management options for wet landscapes derived from tailings ponds have been researched but are not adequately demonstrated.”



ROYAL SOCIETY OF CANADA REPORT

Independent Review of Oil Sands Operations (3)

Major Conclusions

1. The industry is not causing widespread damage to ecosystems or the health of regional residents;
2. There are viable mine and tailings reclamation systems under development that should allow long-term sustainable landscapes to be achieved; and
3. Government and industry must do a better job of monitoring and communicating the results to stakeholders as well as providing the mechanisms to ensure financial security for Albertans regarding reclamation liabilities.



Moving the tailings narrative from.....



....to sustainable reclamation outcomes.



SUNCOR POND 1 RECLAMATION – WAPISIW LOOKOUT