COSIA Vision

To enable responsible and sustainable growth of Canada’s oil sands while delivering accelerated improvement in environmental performance through collaborative action and innovation.
Aspirations

We take pride in what we do and will strive to...

- Produce our oil with lower greenhouse gas emissions than other sources of oil.
- Be world leaders in water management, producing Canadian energy with no adverse impact on water.
- Transform tailings from waste into a resource that speeds land and water reclamation.
- Be world leaders in land management, restoring the land and preserving biodiversity of plants and animals.
Project Portfolio - Results

TO DATE:

Technology Sharing

- 936 technologies costing $1.33 billion to develop

Active Projects

- 276 projects = $680 million

Implementation Decisions

- 347 implementation decisions on technologies developed & shared
Environmental Technology Assessment Portal

- Assess potential solutions to current and future technology gaps and opportunities.

- Technology can be submitted for assessment, through an online non-confidential disclosure.

- Anyone can submit an idea for assessment.

- All third party intellectual property rights completely protected.
Call for Letters of Intent (LOIs) is live now through December 19

Google: “IOSI” for application template and more context, including the bubble diagram of interested areas

Tailings-specific concepts can be submitted for industry funding and collaborative development

Anyone can submit an idea for assessment.

All third party intellectual property rights protected.
Tailings Aspiration

We will strive to...

“Transform tailings from waste into a resource that speeds land and water reclamation.”
Tailings Opportunity Areas & Gaps

COSIA EPA members will strive to transform tailings from waste into a resource that speeds land and water reclamation.
Key Focus Areas – Capping and Reclamation

To be discussed by Jennifer in a moment.
Key Focus Areas – Environmental Net Effects (ENE)

- Important to assess and understand the long-term environmental impacts of new tailings technologies
- Operators are not interested in solving one environmental problem while making other environmental areas worse
- ENE assessment protocols and tools have been developed for Water and GHG
- Assess long-term impact on GHG generation, land disturbance, water inventory, relative capital and operating costs
- Long-term impacts of tailings management options are highly dependant on lease conditions
Key Focus Areas –
Tailings in Pit Lakes

Studies continue to support that sequestering tailings in pit lakes is an environmentally effective means of reclaiming tailings.

There are about 35 pit lakes currently planned for the region.

Researching treatment of fluid tailings prior to placing in pit lakes to:

– Increase storage efficiency through densification
– Minimize the impact of tailings on the water column.
– Minimize GHG formation.
Key Focus Areas – Commercially Ready On-Line Instrumentation

- Real-time, on-line or at-line analyzers to control tailings treatment processes and consistently produce tailings deposits that meet specifications
- Key characteristics include bitumen content, clay content, density, segregation/dewatering potential, Sands-to-Fines Ratio (SFR), floc size, PSD, rheology, electrical and hydraulic conductivity, yield stress
- Currently most tailings treatment processes rely on
  - Subjective assessments of deposit quality from visual observations to provide process control feedback
  - Annual pond surveys to assess effectiveness of previous years’ tailings operations
  - Conventional plant control systems like flow meters and densitometers
- Members are currently piloting analyzers that measure most of the key tailings characteristics
Key Focus Areas - Modelling to Improve Predictions of Commercial Deposit Consolidation

-member already have models to predict the consolidation and performance trajectory of most deposit types, but recognize there is room for improvement (includes both virtual predictive models as well as lab or field tests to acquire data to feed to these models)

- Tailings Directive D085 requires operators to ensure that new tailings are Ready to Reclaim (RTR) within ten years of end of mine life and
  - RTR performance criteria are tracking to the expected trajectory
  - For each deposit type, suitable indicators will be monitored and indicate the expected trajectory

- There are twelve active projects where at least part of the scope includes improved modeling of consolidation behaviour
Past Project Highlights

- Tailings consolidation columns (Canadian Natural*)
- Evaluation of on-line in-pipe K40 analyzer (Canadian Natural*)
- Demonstration Pit Lake (Suncor)
- Non-segregating tailings (NST) deployment (Canadian Natural)
- Co-mixing of fluid fine tailings and overburden (Syncrude)
Summary

- Tailings technology priorities have evolved significantly over the past few years
- COSIA member collaboration is increasing – with each other and with third parties
- Significant increase in commercial deployment of technologies
- Continued interest in new technologies that both improve environmental performance and reduce costs.
COSIA Challenges

In order to help mobilize the minds and resources of external stakeholders and global solutions providers, COSIA has identified a number of COSIA Challenges that explicitly state the innovation requirements to fill the identified gaps in knowledge and technology within each of COSIA’s EPAs.

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What?

– COSIA Challenges provide focused, actionable descriptions of the current state of certain Gaps as well as the desired outcomes without prescribing the means for reaching the outcomes, as this could limit potential solutions.

Who?

– COSIA is keen to hear from anyone who believes they have a solution to one or more of the COSIA Challenges - whether they be external companies (small or large), academic researchers, other research institutes, consultants, entrepreneurs or inventors.
The definition of “fines” in the oil sands is a particle size less than:

a) 300 µm  
b) 110 µm  
c) 44 µm  
d) 2 µm
Background

- Fines-dominated deposits have been created commercially using thickeners, centrifugation and inline flocculation.
- Both sand and fines-dominated deposits are expected to be capped in some manner.
- Caps may be used to:
  - provide separation between underlying tailings materials and overlying reclamation materials,
  - accelerate consolidation of the tailings,
  - serve a beneficial role as part of the reclamation substrate and
  - facilitate physical access to the deposits for the purpose of placing reclamation materials.
- There has been successful commercial-scale experience in capping sand-dominated deposits, however, there has been limited experience with capping of soft, fines-dominated tailings materials placed in relatively thick deposits which are subject to substantial post-placement settlement and associated water release.
Solution Description

✿ COSIA members are seeking robust, cost-efficient solutions to stabilize, cap and reclaim fines-dominated tailings deposits in excess of 10m depth, originating from treated fluid fine tailings applications. These deposits typically exhibit low load bearing strength.

✿ Successful technologies will safely and cost-efficiently aid with:
   – Deposit preparation for access, potentially by means of remote operation.
   – Dewatering performance improvement
   – Material placement
   – Instrumentation/monitoring/modeling of the above.
Additional Information

Consider fines dominated deposits placed in three structures:

- One structure with a size of 2 km by 2 km by 50 m depth. Typical fill time for such a structure would be 10 to 15 years.

- One structure with a size of 1 km by 1 km by 25 m depth. Typical fill time for such a structure would be 1 to 2 years.

- One small structure of 0.5 km by 0.5 km by 10 m depth. This could be considered a residual MFT area that is left over after the majority of the material in a pond is converted.

Detailed material properties for fines dominated deposits created by flocculation, flocculation/centrifugation or via thickeners are provided in Appendix 1 of the Challenge.
Possible Capping Process Steps of Interest

- Deposit preparation during the final stages of tailings operation
- Preparation of deposit for safe access through natural processes
- Technology-assisted preparation of deposit for safe access
- Enhancing deposit dewatering performance through improvements in management of dewatering paths
- Small lift, even-layered material placement/spreading on soft tailings

Approaches not of Interest

- Capping of sand-dominated deposits
- Technologies that are directly tied to the bitumen extraction process
- Sand, water, diesel fuel and power can be considered available to the technology. All other materials will need to be supplied from outside sources. Should any specialty chemicals be proposed, then both cost and logistics/supply chain considerations for full commercial deployment as well as additional environmental exposure as a result of the chemistry will need to be acceptable.