

2013 Large Final Emitter Update

Justin Wheler/John Storey-Bishoff
Air and Climate Change Policy Branch
Environment and Sustainable Resource
Development

Overview

- Specified Gas Emitters Regulation
- 2012 compliance overview
- Update on 2012 facility audits
- Updates for 2013 emissions year
 - Oil Sands Mining fugitives quantification
 - Methodology documents
- Post 2013
 - Updates to global warming potential

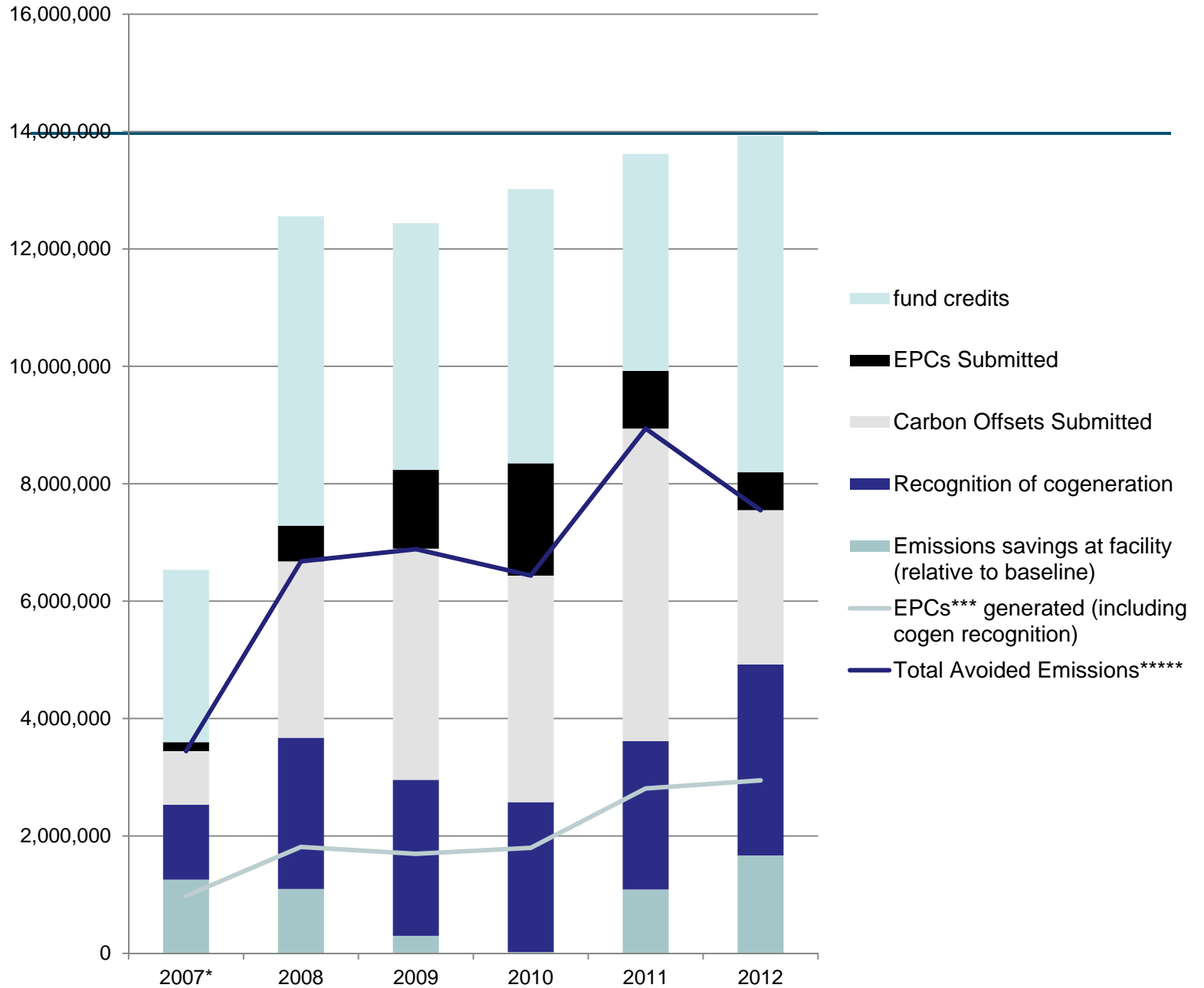
Specified Gas Emitters Regulation

- In force as of July 1, 2007, expires September, 2014
- Large final emitter regulation (>100 kt CO₂e)
- Facility specific historic baseline
- Intensity based
- Full compliance flexibility
 - On site reductions/recognition of cogeneration
 - Retire offset credits (from non-regulated projects)
 - Retire emissions performance credits (from facilities that reduce intensity beyond target)
 - Pay into compliance fund at \$15/tonne (price ceiling)

2012 results

- 106 facilities from 13 sectors
- Total emissions 107.2 million tonnes of carbon dioxide equivalents.
- Total emissions from these facilities account for about half of Alberta's total provincial emissions, and about 70 per cent of total industrial emissions.

All Facilities Compliance Total



Program Results to Date

Results to Date (kt)

	2007	2008	2009	2010	2011	2012	Total
Emissions savings at facility (relative to baseline)	1,250	1,100	290	20	1,090	1,670	5,420
Recognition of cogeneration	1,280	2,580	2,660	2,550	2,530	3,250	14,850
Carbon Offsets Submitted	910	3,000	3,940	3,860	5,330	2,630	19,670
EPCs Submitted	150	610	1,340	1,910	980	650	5,640
EPCs generated (including cogen recognition)	980	1,810	1,700	1,800	2,810	2,950*	12,040
CCEMF Payments (\$M)	\$44	\$79	\$63	\$70	\$55	\$86	\$398
Total Tonnes owed	4,000	9,070	9,480	10,400	9,960	9,140	52,060
Total Avoided Emissions	3,450	6,680	6,890	6,430	8,940	7,550	39,930

2012 Compliance Summary

Sum of Tonnes

Tonnes Retired by Compliance Year/Type

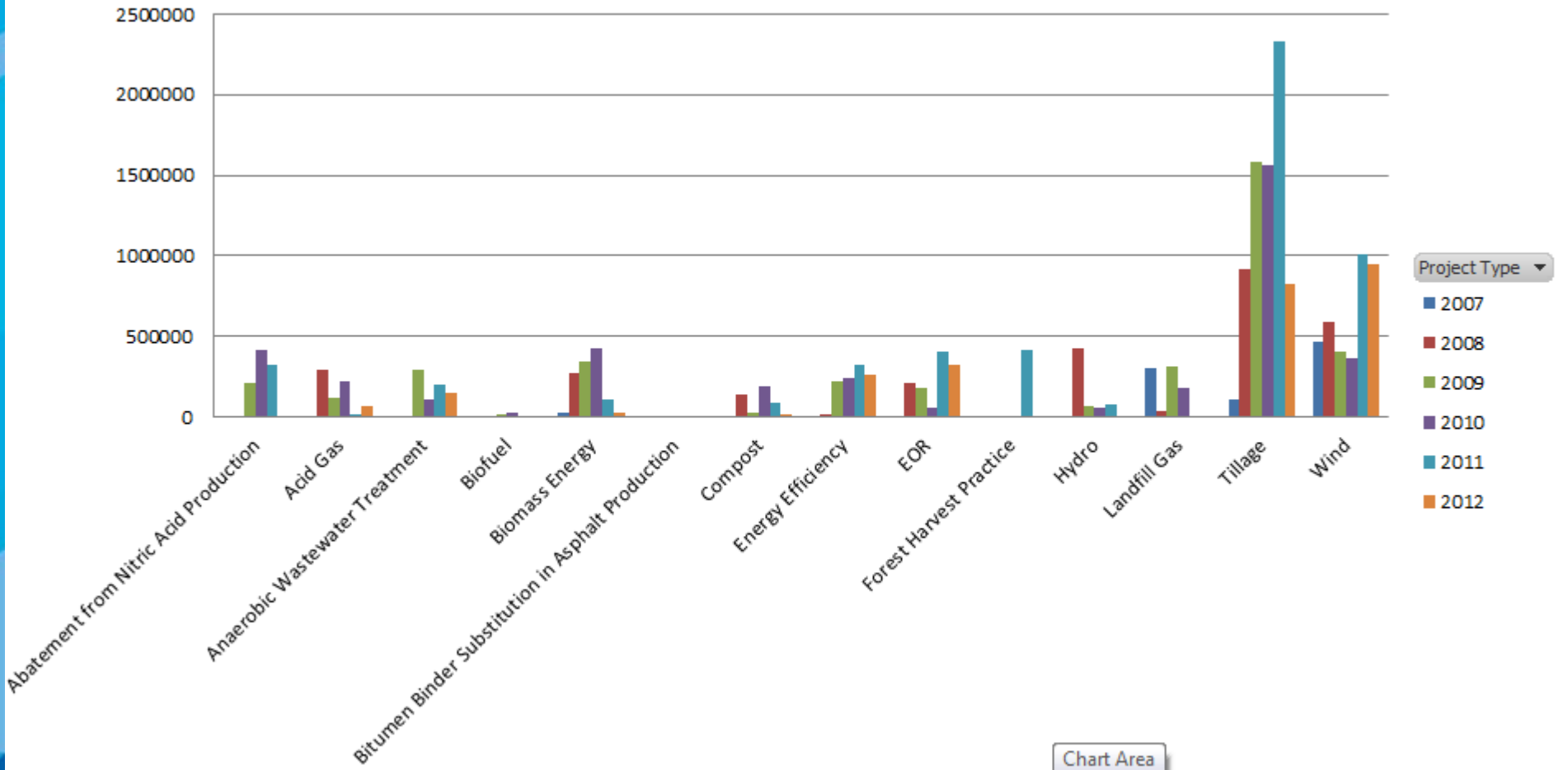


Chart Area

Compliance Year Retired

2012 Audit Update

- Final part of regulatory assurance. Expectation of full access to required information and personnel to facilitate the audit.
- 23 audits, 11 facilities selected for reasonable level assurance audit
 - Risk based plus random element
- New internal processes for contracting with verifiers
- Final reports and close out meetings with facilities over the next several weeks
- Some negative and qualified results already
- Introducing a more formal process for audit close out
 - Certifying Official and facility's third party verifier to sign off on required changes or responses.
 - Form to be submitted along with next compliance or with resubmission if required

EPC requests

- Ensure adequate justification is supplied with EPC request to assist in evaluating the requests
- EPCs will be granted in part on the strength of the justification supplied
- Part of the evaluation will be the impact on indirect emissions associated with changes in operation
- Also evaluate baseline applicability
- For 2011 3.3 Mt EPCs requested, 1.7 Mt issued

EPC registry

- 2012 saw the first usage of the Emissions Performance Credit Registry
 - A few minor bumps, thanks for your patience
- Looking to add a public view of all current EPC states for transparency and ease of trading
- Make sure you retire your credits on the registry for compliance in advance of the compliance deadline
- If you have any questions about the registry please let us know well in advance of the compliance deadline if you can

Oil Sands Area Fugitive Quantification

- Prescribed sampling method implemented for 2013 after consultation with affected facilities
- Base method uses EPA flux chamber survey
 - Prescribed sample number per source based on standard error
 - Technology advancement to continuous concentration measurement instead of grab sample
 - Allowance for application of innovative alternative methods with equal or greater accuracy

Oil Sands Area Fugitive Quantification

- Sample window extended in 2013 to November 4th to accommodate equipment issues
- 2014 sample window June-September
- Feedback on current guidance and debrief of 2013 sampling program will be used to make minor guidance adjustments for 2014
 - Affected facilities will be consulted
- Thorough data review post March 31st will inform 2015 guidance

Guidance Updates

- New name 😊 (again)
- Methodology format mandatory for 2013 compliance
 - Clarified requirements
 - Removed generic equation for calculating cogeneration emissions. Facilities are expected to use the most accurate quantification method available for their site.
 - Clarification on detail and documentation needed for missing records
 - Emission factors within a source category should be from a consistent reference source for each species, wherever possible.
- Baseline guidance to be released for comment before year end. Will reinforce methodology requirements.
- No revisions to compliance forms

Future Changes

- Significant changes to the *Specified Gas Emitters Regulation* are possible for the 2014 emissions year to support potential equivalency with federal regulation and any updates to provincial climate change strategy.
- Updates to global warming potentials and resulting updates to approved baselines for the 2014 emissions year.
- ESRD is looking at potential methods to create appropriate incentive for reduction of indirect emissions.

Global Warming Potential

- Update to 2007 IPCC (fourth assessment report) values consistent with Environment Canada
- SGRR update for 2013 emissions year
- SGER update expected for 2014 emissions year (requires Regulation change)
- Baselines will be reset mid 2014 for all facilities based on application of new factors to previous submissions

IPCC Global Warming Potentials - 100-Year Time Horizon

Greenhouse Gas	Formula	Current GWP	2014 GWP
Carbon dioxide	CO ₂	1	1
Methane	CH ₄	21	25
Nitrous oxide	N ₂ O	310	298
Sulphur hexafluoride	SF ₆	23 900	22 800
Hydrofluorocarbons (HFCs)			
HFC-23	CHF ₃	11 700	14 800
HFC-32	CH ₂ F ₂	650	675
HFC-41	CH ₃ F	150	92
HFC-43-10mee	C ₅ H ₂ F ₁₀	1 300	1 640
HFC-125	C ₂ HF ₅	2 800	3 500
HFC-134	C ₂ H ₂ F ₄ (Structure: CHF ₂ CHF ₂)	1 000	1 100
HFC-134a	C ₂ H ₂ F ₄ (Structure: CH ₂ FCF ₃)	1 300	1 430
HFC-143	C ₂ H ₃ F ₃ (Structure: CHF ₂ CH ₂ F)	300	353
HFC-143a	C ₂ H ₃ F ₃ (Structure: CF ₃ CH ₃)	3 800	4 470
HFC-152a	C ₂ H ₄ F ₂ (Structure: CH ₃ CHF ₂)	140	124
HFC-227ea	C ₃ HF ₇	2 900	3 220
HFC-236fa	C ₃ H ₂ F ₆	6 300	9 810
HFC-245ca	C ₃ H ₃ F ₅	560	693
Perfluorocarbons (PFCs)			
Perfluoromethane	CF ₄	6 500	7 390
Perfluoroethane	C ₂ F ₆	9 200	12 200
Perfluoropropane	C ₃ F ₈	7 000	8 830
Perfluorobutane	C ₄ F ₁₀	7 000	8 860
Perfluorocyclobutane	c-C ₄ F ₈	8 700	10 300
Perfluoropentane	C ₅ F ₁₂	7 500	9 160

Questions?

Justin Wheler

Justin.wheler@gov.ab.ca

780-644-6982

John Storey-Bishoff

John.storey-bishoff@gov.ab.ca

780-644-7119

Alberta

Alberta Offset Program Updates

Highlights from 2013

- Program
 - Technical Guidance for Reasonable Assurance Verification
- Offset System
 - New protocols used for compliance
 - Consistent volumes of offset credits being used for compliance
 - Growing interest to use more of the approved protocols
 - Alberta protocols adopted into other systems

Protocol Review (Section 4.8)

- Mandatory government review
 - Approximately every 5-years
 - BAU and additionality assessment
- If the activity IS NOT deemed to be additional:
 - Issue a summary of analysis
 - Review written comments
 - Director will issue a final decision
- If the activity IS additional:
 - Returned to technical review
 - ESRD may identify constraints

Requests for Deviation (Section 4.8.1)

- Addresses instances where minor variations to an approved protocol is required.
- Request is submitted to the Director and must address the following:
 - Why the protocol could not be used
 - The specific change being requested
 - Impacts to the quantification and protocol
 - Sample calculations
- Deviation requests may be approved, denied, or referred to a formal protocol review process
- Will be addressed in more detail in project guidance revisions

Industry Initiated Protocol Review (Section 4.8.2)

- Complete a Request to Revise a Protocol form
 - ESRD needs a very clear understanding of the issue, proposed revision, and rationale
 - Need to understand:
 - Why the approved protocol could not be used
 - Additionality of the proposed revisions
 - Impacts to the existing protocol
 - Sample calculations
 - If accepted,
 - Protocol will be flagged on the registry
 - New projects need ESRD approval to proceed; may delay project extension reviews/requests
 - Will be returned to technical review and adhere to the protocol development process
 - Initiating party must be able to pay for the review process

Timelines and Review Process

- No fixed review dates
 - Protocols are advanced as they meet program requirements
- Use of web-based meetings
 - More participation
 - Ability to engage more expertise

Public Review (Section 4.6)

- Consolidated the Stakeholder Review and 30-Public Comment into a “Public Review” (Section
 - Opportunity to streamline the review process
 - Drafts posted for 30-day comment.
 - 2 to 3 hour web-based meeting to review and respond to questions on the draft protocol
 - Receive and respond to written comments
 - Final recommendations provided to the Director for approval

“Handbook of Emission Factors”

- Consolidation of emission factors into a “Handbook of Emission Factors for the Alberta Offset System”
 - Stand-alone document
 - Address emission factors and quantification methodologies applicable to multiple protocols
 - Maintain consistency
 - Subject to review and up-date periodically

Global Warming Potential (Handbook)

- Environment Canada up-dated factors. ESRD reviewing adoption.

	Old	New
CO2	1	1
CH4	21	25
N2O	310	298

- If change,
 - Will apply to all Offset projects
 - Will require baselines to be up-dated to reflect the change
 - No additional credit opportunity for historic tonnes

Electricity Grid Displacement Factor (Section 3.11; Handbook)

- For 2014
 - Remains 0.65 tonnes of CO₂e/MWh
- For 2015 on expect:
 - Updated factor: 0.59 tonnes of CO₂e/MWh
 - Methodology was aligned with the *World Resource Institute/World Business Council*
 - $EGDF=(w*BM)+(1-w)*OM$
 - Where
 - BM=build margin
 - OM=operating margin
 - w=0.5, based on on-peak, baseload or intermittent generation for non-firm power

Electricity Grid Intensity Factor

- For 2014
 - Remains 0.88 tonnes of CO₂e/MWh
- For 2015 on, expect:
 - Updated factor: 0.64 tonnes of CO₂e/MWh
 - Updated factor is the electricity grid displacement factor scaled up to account for transmissions and distribution losses
 - This factor will be applied to projects that increase electricity consumption, decrease electricity consumption or generate electricity at point of use.

Electricity Options



1) Grid scale renewable energy displacement to grid 0.65 tCO₂e/MWh to 0.59 tCO₂e/MWh



2a) Increase on-site grid electricity use 0.88 tCO₂e/MWh adjusted for line losses to 0.64 tCO₂e/MWh

2b) Energy efficiency projects 0.65 tCO₂e/MWh to 0.64 tCO₂e/MWh



3) Distributed renewable displacement at point of use 0.88 tCO₂e/MWh to 0.64 tCO₂e/MWh

Avoided CH₄ from Waste Diversion



Review of Quantification of Avoided CH₄ Emissions

- Scholl-Canyon model for offset quantification:

$$Q = \sum_{x=1}^i [\mathbf{k} * \mathbf{M} * \mathbf{Lo} * e^{-k(x-1)} * (\mathbf{1} - \mathbf{R})] * (\mathbf{1} - \mathbf{OX})$$

- Updated default model parameters (DOCf, DOC)
- Waste characterization guidance
- K-value calculation guidance
- Further research (k, SEM, Lo)
- Forward crediting assessment

Impact to existing protocols

- Affected:
 - Anaerobic decomposition of agricultural materials
 - Aerobic composting
 - Aerobic landfill bioreactor
 - Non-incineration of thermal waste conversion
 - Biofuel production and usage
 - Diversion of biomass to energy from biomass combustion facilities
- Not affected:
 - Protocols without waste diversion, including the landfill gas capture and combustion protocol

Biomass – A Brief Overview

- First technical review (2011)
 - Identified a number of gaps
- Second technical review (2013)
 - Scope has been limited to wastes
 - Have a range of eligible baseline scenarios
 - Heat and power generation remain eligible; however, use of biomass waste for heat is approaching BAU
- Going to public review shortly
- Note:
 - The revised protocol may already encompass anaerobic decomposition of agricultural materials and non-incineration of thermal waste conversion.
 - May be an opportunity to merge these protocols.



Under review

- In technical review:
 - Aerobic composting projects
 - Biofuels production and usage
 - Carbon Capture and Storage
 - Energy generation from the combustion of biomass waste
 - Landfill gas capture and combustion
 - Enhanced oil recovery
 - Afforestation protocols
- In queue
 - Will be contacted later in November to discuss status and next steps

Protocol Updates

- New
 - Distributed renewable energy generation
 - Fuel Switching in Mobile Equipment

- Terminated
 - Acid gas injection



Verification Guidance

- First of its kind
 - Merges principles from accounting and engineering to provide a framework for GHG verifications to a reasonable level of assurance.
 - Was a principles based document
- Well received good feedback thus far
- 2013 is the first year of use

Verification Con't

- Set ISO 14064-3 as the base audit standard
 - Other standards can supplement
- Uses a 4-phase audit approach
 - Verification evaluation
 - Planning
 - Execution
 - Completion
- Clarified mandatory steps
 - Balanced mandatory requirements with guidance to allow company specific approaches
- Emphasis placed on records and documentation to support GHG reduction assertions
 - More emphasis on data and records

Other Initiatives

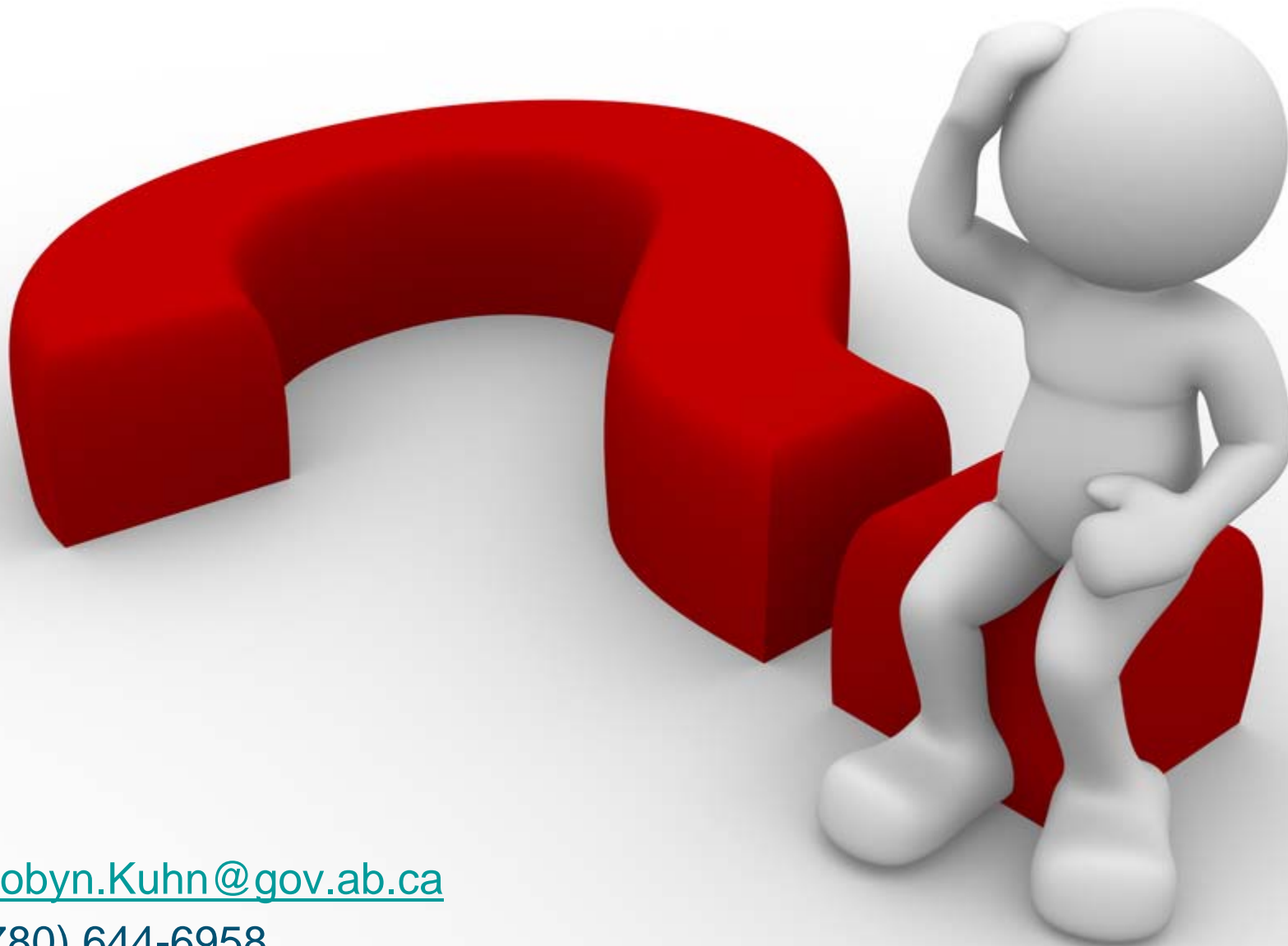
- Accreditation requirements for verifiers
 - Under review
- Broader assurance options
 - Verification is one component
 - Considering other options such as business licenses, training requirements for project developers, roles of other professional organizations, complaint processes
 - Ultimately, quality of offset reductions is a joint effort by all parties

Audit – Interim Results

- 12 projects selected this year.
- Preliminary results coming in.
 - Follow-up with project developers in November
- Generally, seeing about 85 per cent passing at reasonable assurance over the last 5 years.

Reminders:

- Biogenic CO₂ is considered carbon neutral and is exempt from emission reduction calculations (Section 3.14)
 - Cannot get offset credits for reducing biogenic CO₂
- If a protocol becomes BAU, the project gets the remainder of its credit period (or, its 5-year extension).
 - No extensions are given and no new projects accepted
- Credit opportunity for a project ceases if the activity becomes regulated



Robyn.Kuhn@gov.ab.ca
(780) 644-6958

Alberta

Climate Change and Emissions Management Corporation (CCEMC)



-
- **Responsible for investing the funds collected through the SGER**
 - **Alberta based, not-for-profit organization**
 - **Delegated administrative organization (DAO) hybrid model:**
 - **Operates at arms-length from the GoA**
 - **Independent board of directors**
 - **Accountable to Minister of ESRD through grant agreement**

Mandate

- **Reduce greenhouse gas emissions,**
 - ...by investing in the discovery and development of clean technology.
- **Improve Alberta's ability to adapt to climate change...**



Guiding Principles

- **Aligned with public policy**
- **Sustainable**
- **Transparent and accountable**
- **Strong business and technical acumen**
- **Disciplined third party review process**
 - **Objective, fair, rigorous**
- **Best projects selected**
- **Focus on performance**

Governance

- **Virtual organization**
- **Guided by Board of Directors:**
 - **13 experienced leaders**
 - **Diverse cross-section of expertise**
 - **Strong technical and business oversight**
- **Supported by a Management Team:**
 - **Skilled set of service providers**



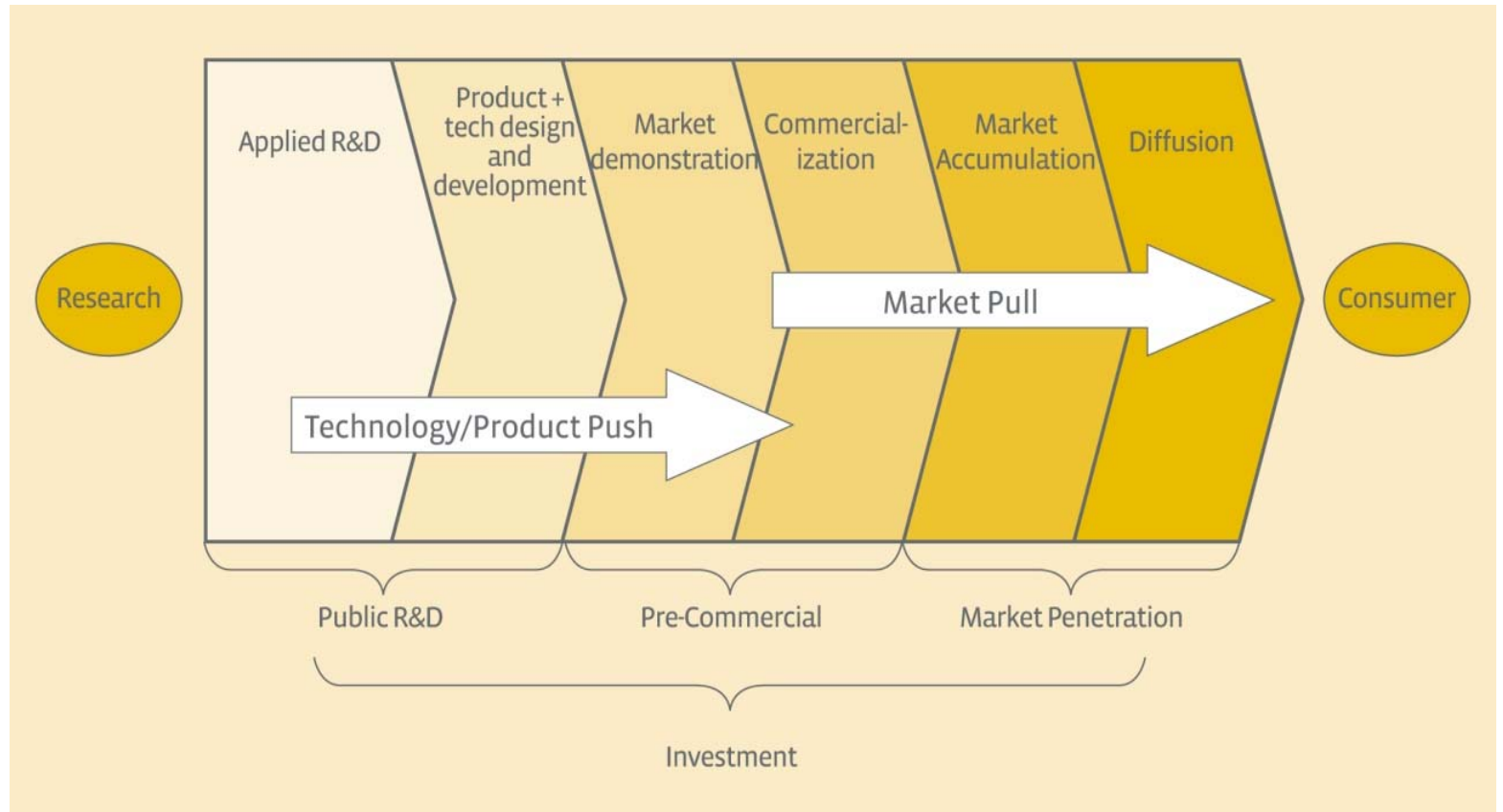
Technology Holds the Promise

- **We believe in the promise of technology**
- **CCEMC accelerates technology development and deployment by leveraging:**
 - Resources
 - Applications
 - Partnerships
- **Technology benefits include:**
 - Accelerated achievement of targets
 - Promotion of economic growth
 - Generation of new jobs
 - Enhanced competitiveness

Operating Model

- **Funds are received from annual SGER fund contributions**
 - 5.5 years of compliance – \$398M received
- **Funds committed to projects through an RFP process**
 - typically 2 Requests for Proposals per year
- **Focus areas:**
 - **Greening energy production**
 - **Renewable and non-renewable energy**
 - **Conserving and using energy efficiently**
 - **Carbon capture and storage**
- **Also supports adaptation and biological projects**
- **Funds managed as a portfolio**

Innovation Chain



RFP Process

- 1. Request for proposals**
- 2. Expressions of Interest (EOI) submitted**
 - Technical review
 - Review consensus
 - Recommendation to Board of Directors
 - Board decision
- 3. Full project proposals submitted**
 - Project advisor assigned
 - Presentation to review panel (panel approx. 15 members)
 - Technical, financial review
 - Review consensus
 - Recommendation to Board of Directors
 - Board decision

RFP Process (Continued)

- 4. Successful proponents are notified**
- 5. Contribution agreement executed**
- 6. Performance monitoring & fund disbursement**
 - CCEMC contribution tied to milestones & deliverables**
 - Annual reports submitted to CCEMC via project advisor**
 - Project completion**
 - Remaining holdback of funds provided after all contractual agreements have been fulfilled (final report, GHG verification, etc.)**

Typical Funding Conditions

- Vary by round of funding
- All stages of innovation spectrum
- 1:1 Match minimum
 - Require unencumbered cash from proponent
- Technology must have application in Alberta
- 3rd party verification required

What it Takes

- **This is a competitive process!**
- **Critical criteria:**
 - **Aligned with the mandate & the RFP**
 - **GHG reductions (real/potential)**
 - **Innovation**
 - **Quality of the submission**
 - **Address the information requirements**
 - **Transparency**
 - **Budget, team and project management**

Success to Date

- **In the three years of operation:**
 - **51 clean technology projects approved**
 - **Approximately \$213 million committed**
 - **Projects valued at more than \$1.26 Billion**
 - **About 5:1 leverage**
- **In addition:**
 - **\$7 million in funding for three adaptation projects**
 - **\$8.4 million for biological project area**
 - **\$35 million allocated for grand challenge**



Overview of Rounds

Round	Project Type	# of Projects	Funds Committed (\$ M)
1	All GHG Reduction Areas	14	58.8
2	Energy Efficiency	5	24.4
3	Renewable Energy	4	22.6
4	Greening Energy Production & Carbon Capture	6	46
5	Small & Medium Enterprises	10	4.6
6	Energy Efficiency	4	9.6
7	Renewable Energy	8	46.8
8	Cleaner Fossil Fuel Production	TBD	TBD

Grand Challenge

- The Grand Challenge is a \$35 million open innovation challenge that will create new, carbon-based products and markets
- Expected to identify technologies with significant potential greenhouse gas reductions by transforming carbon dioxide from a liability into an asset

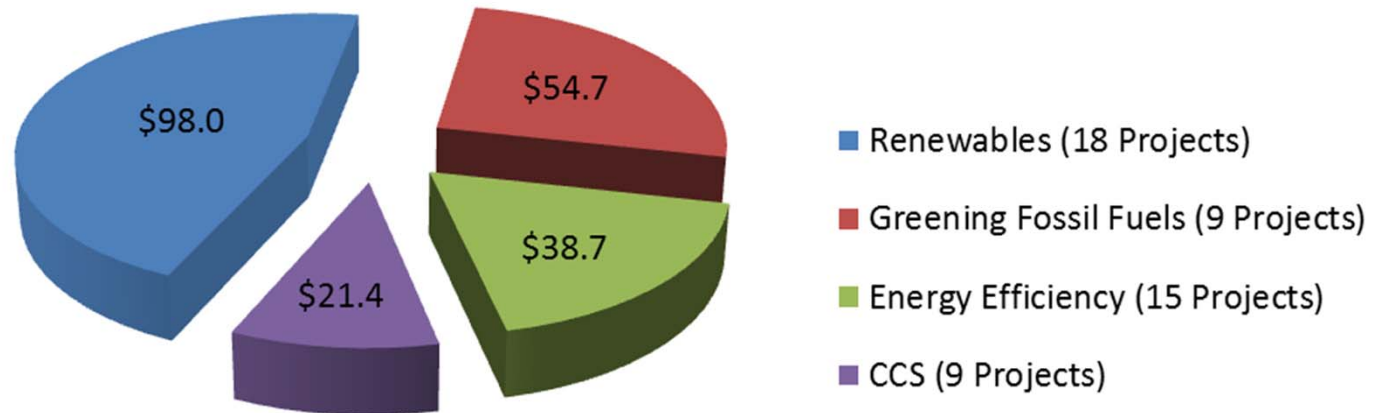
Grand Challenge (Continued)

SCHEDULE	Phase 1	Phase 2	Phase 3
Round 1 2013 - 2014	GLOBAL LAUNCH Open to all eligible applicants SUBMISSION PERIOD: February 21, 2013 - July 31, 2013	COMPREHENSIVE PROPOSALS By invitation only SUBMISSION PERIOD: October 1, 2013 - November 28, 2013	AWARDS EVENT April 14-17, 2014 20 Awards CAD\$500,000 \$10 MIL in Grants
Round 2 2015 - 2016	2 Year Development	GLOBAL LAUNCH New entrants invited to submit SUBMISSION PERIOD: March, 2015 - July, 2015	AWARDS EVENT March 2016 5 Awards CAD\$3 MIL Grant CAD\$15 MIL in Grants
Round 3 2017 - 2018	2 Year Development	FINAL EVALUATION of Round 2 Awardees SUBMISSION DEADLINE: March 2017	GRAND EVENT March 2018 CAD\$10 MIL Grant Awarded

Portfolio by Strategic Area

Strategic Investment Areas reflect Alberta's Climate Change Strategy

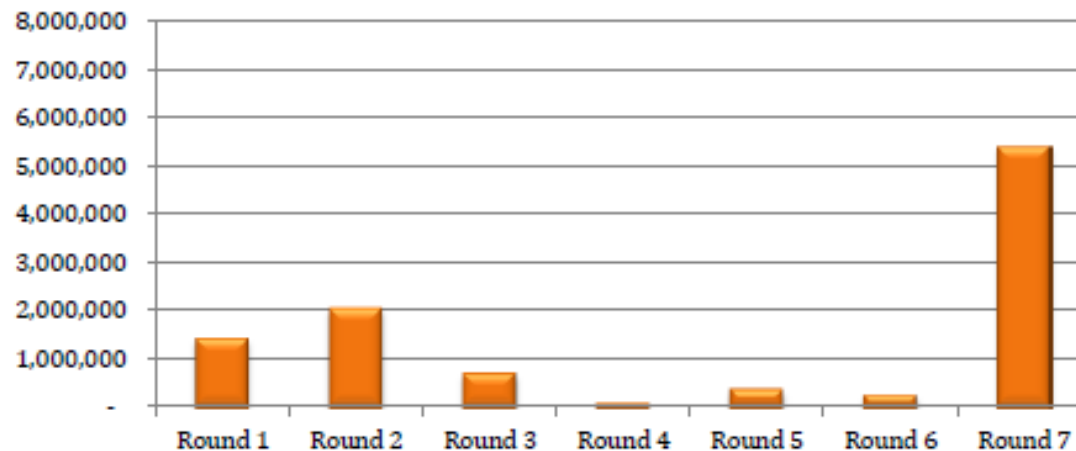
CCEMC Funding by Strategic Investment Area
(\$ millions)



Portfolio by Sector

Total CCEMC commitments after Round 7 – 51 projects for \$213 M
Total Reductions by 2020 – 10.2 MT

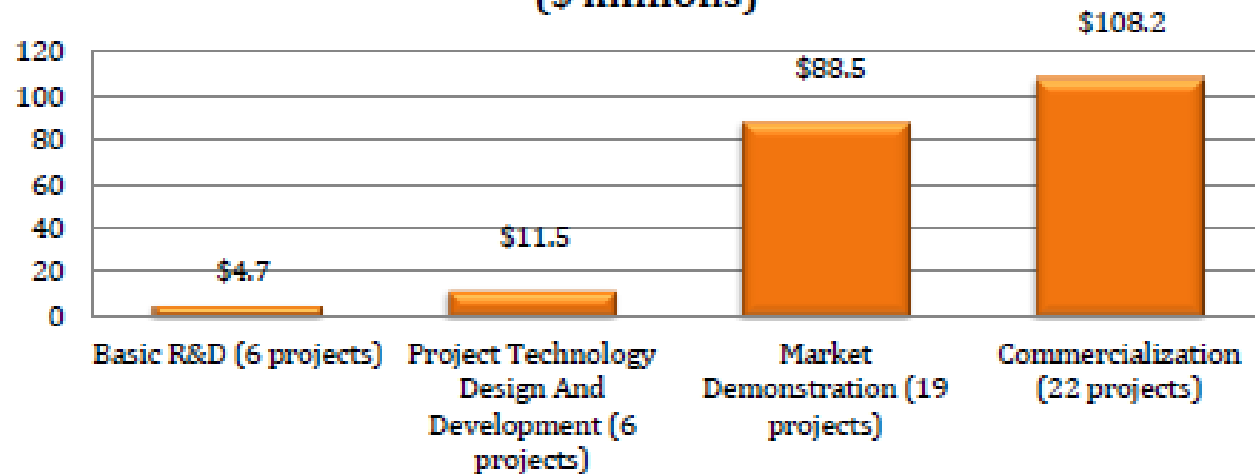
Project Emission Reductions by Round
(tonnes CO₂e by 2020)



Portfolio by Development Stage

Investments across the innovation spectrum

CCEMC Funding by Innovation Step (\$ millions)



Alberta

Thank you



Climate Change and Emissions Management
(CCEMC) Corporation

Ryan Poon

Air and Climate Change Policy Branch, ESRD

Ryan.Poon@gov.ab.ca

780-422-4578

Rob Hamaliuk

Air and Climate Change Policy Branch, ESRD

Robert.Hamaliuk@gov.ab.ca

780-644-8364

References

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