

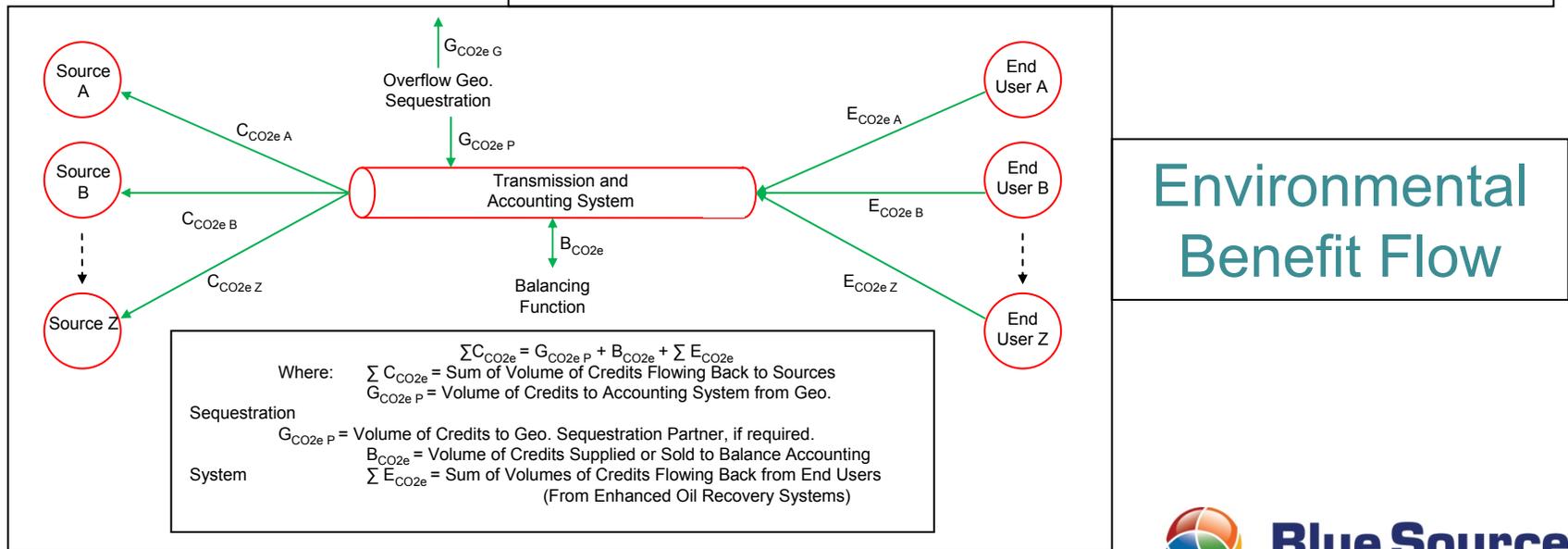
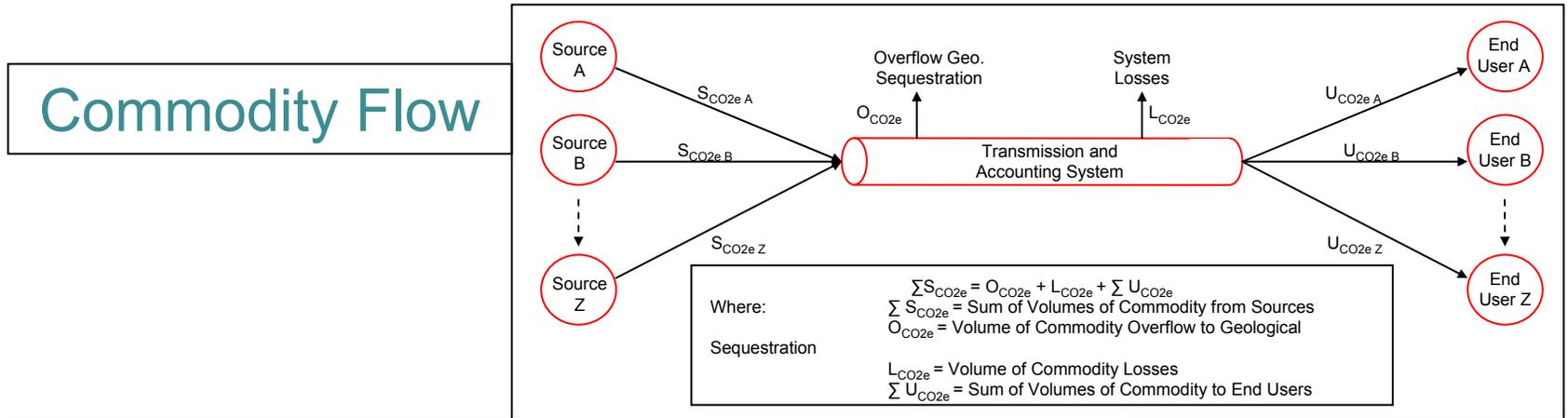
# Commercializing the Greenhouse Gas Benefits from CCS Projects

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# Framing the Topic...



# Carbon Liability Under Existing Alberta Framework



## Capture:

1000 kt CO<sub>2</sub> produced  
-800 kt CO<sub>2</sub> captured/transferred  
+200 kt CO<sub>2</sub> parasitic

**Physical = 800 kt CO<sub>2</sub>**

**Liability = 800 kt CO<sub>2</sub>  
+ 400 kt CO<sub>2</sub>**

## Transport:

20 kt CO<sub>2</sub> fugitives/venting  
30 kt CO<sub>2</sub> operations

**Physical = 780 kt CO<sub>2</sub>**

**Liability = 830 kt CO<sub>2</sub>**

## Storage:

80 kt CO<sub>2</sub> vented  
70 kt CO<sub>2</sub> operations

**Physical = 700 kt CO<sub>2</sub>**

**Liability = 900 kt CO<sub>2</sub>**

**Net Benefit = 600 kt CO<sub>2</sub>**

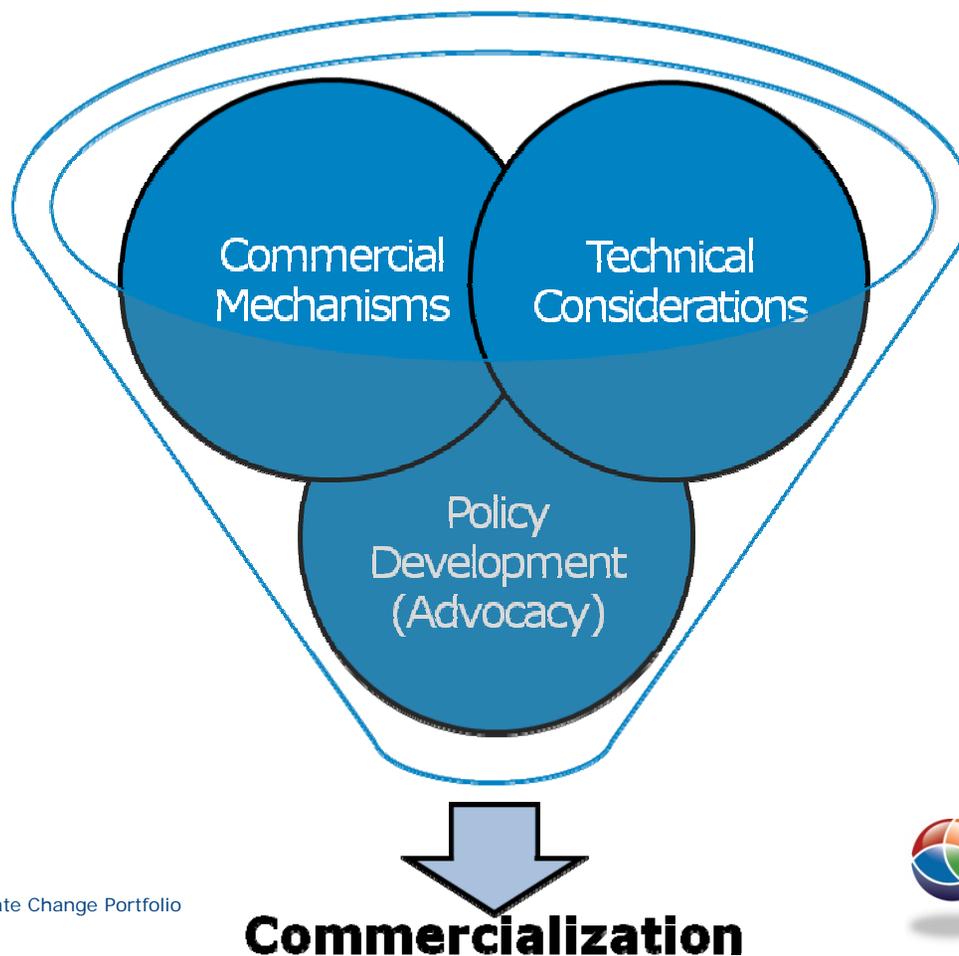
## Conclusions:

1. Gap between physical commodity and associated liability/benefit
2. Liability and control are separated geographically/organizationally/temporally
  - a. Liability remains with the capture site
  - b. Benefit must be captured at the sequestration site
  - c. Administrative requirements can yield delay



# Presentation Outline

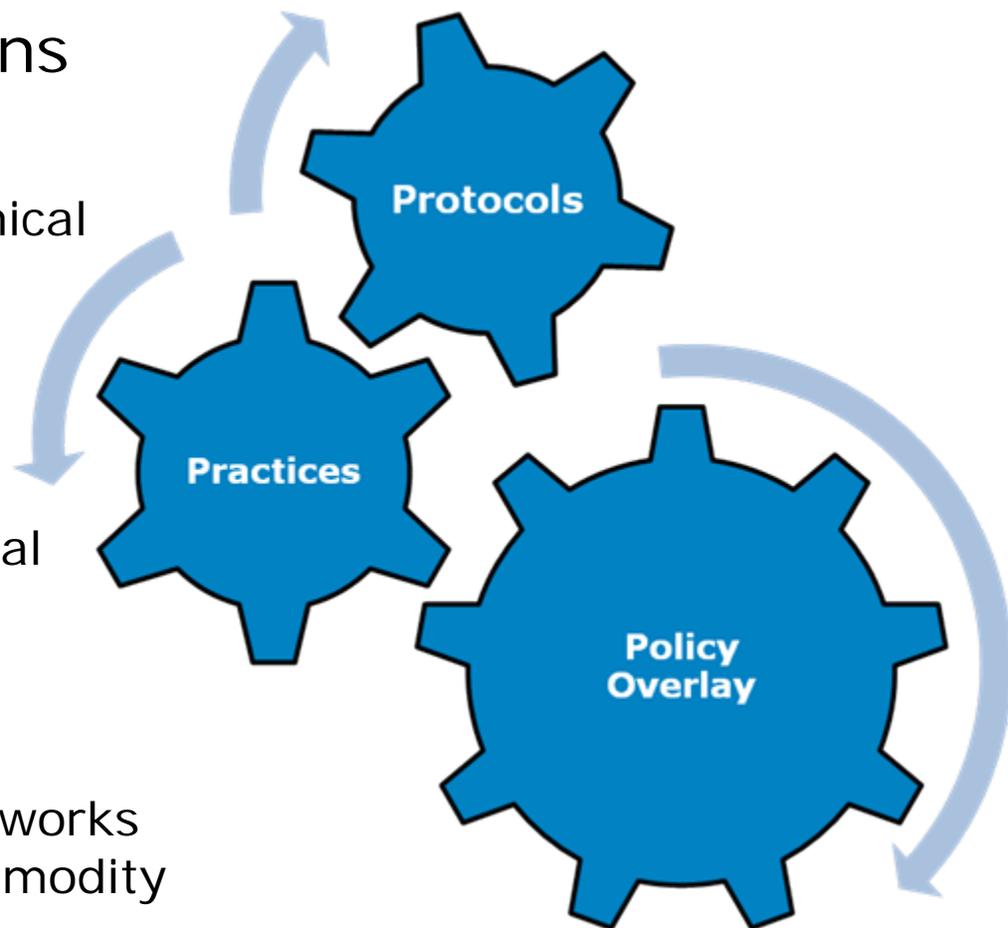
- Three categories for the issues affecting the commercialization of the GHG benefits from CCS



# Technical Considerations

# Technical Considerations

- Technical considerations
  - Policy Overlay
    - Framework for technical discussion
  - Practices
    - Setting out best-practices & operational know-how
  - Protocols
    - Quantification frameworks to create carbon commodity



# Technical Considerations - Policy

- Sample policy / advocacy areas of note:
  - CCS for EOR - concurrent vs. sequential
  - Pore space ownership and long-term responsibility
  - Recognizing early action
  - CO<sub>2</sub> pipeline jurisdictional issues



# Technical Considerations - Practices

- Development of practices through experience
  - Measurement of key parameters
    - What data is to be captured? How often? To what level of uncertainty?
  - Data management through the CCS chain
    - How is information shared? How do we streamline?
  - Long-term monitoring approaches
    - How do we address the perception / risk?



# Technical Considerations - Protocols

- Protocols are where the rubber meets the road
  - Quantification approach for assessing the GHG benefit across the CCS stream
    - Standardized approach to quantification and streamline processes for recognition of benefits
  - Defines project criteria for applicability
    - Provides certainty around project development to support investment with carbon value add-in
  - Regulator buy-in critical for compliance
    - Provides tie-in to development compliance markets ensuring longevity of the approach

# Covers the Full CCS Chain

Capture

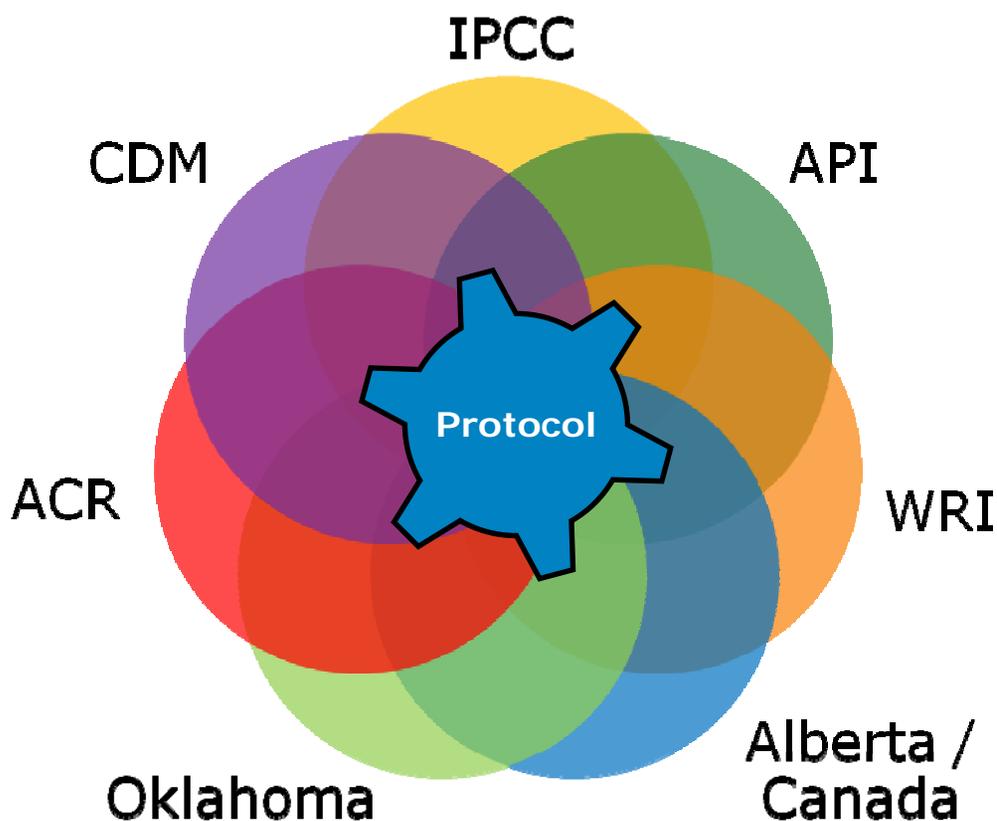
Transmission

Sequestration

- Emission reduction calculation requires tracking from capture to transmission to sequestration
  - Sources of emissions at each step which impact net GHG reduction
  - Data tracking a concern given multiple entities
    - Especially under multiple source, multiple sink scenario

# Technical Considerations - Protocols

- What work has already been completed?



- General Guidance
  - IPCC, WRI
- Methodological Guidance
  - CDM
    - Not approved
  - ACR
    - Project specific
  - Alberta/Canada
    - Underway
  - API, Oklahoma
    - Insufficient detail

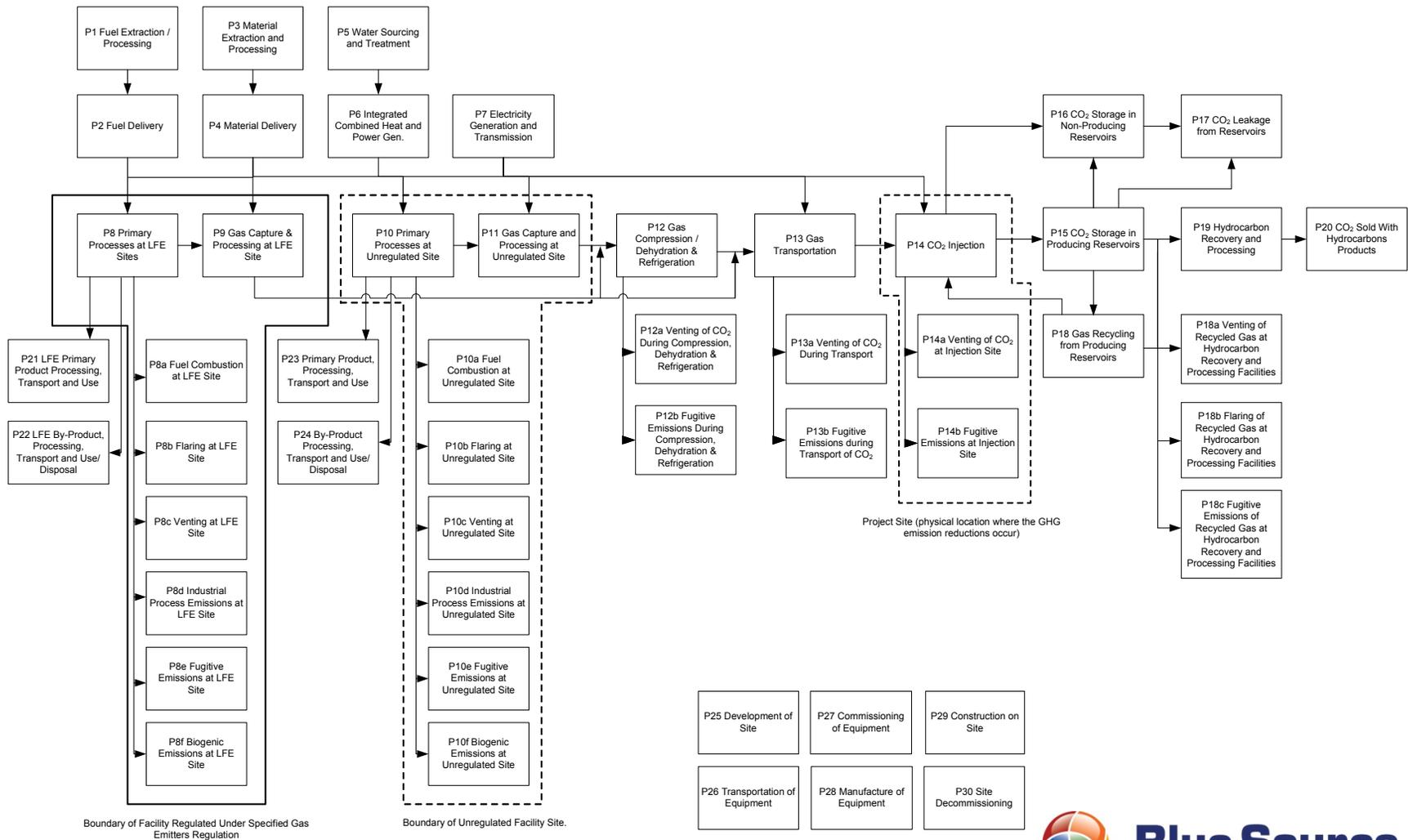
# Technical Considerations - Protocols

- Gap analysis on available methodologies
  - IPCC and WRI
    - Provides guidance on how to approach quantification
  - API and Oklahoma
    - Additional level of detail, Onus put on project developer
  - CDM and Alberta / Canada
    - Detailed approaches that are missing the overlay with US policy and practices
  - ACR
    - Project specific methodologies, lacking standardization

# Development of a Standardized CCS Protocol

- CCS GHG Quantification Protocol Development
  - Bring the right people together
    - NACCSA, Pew Center and American Carbon Registry
    - Broad stakeholder process including technical reviewers
  - Build off of best practice guidance
  - Ensure transparency and process
    - All can have a voice, no one gets a veto
  - Open-source documents
    - Leverage success into all emerging systems
    - Promote outcomes through technical and policy channels

# Process Flow Diagram for the Project Condition



# Commercial Mechanisms

# How this can all play out – as offsets... (No Transfer)

Capture

Transmission

Sequestration

## Physical

1000 t CO<sub>2</sub> produced  
200 t CO<sub>2</sub> parasitic  
800 t CO<sub>2</sub> captured

## Credit

1200 t CO<sub>2</sub> gross  
- 600 t CO<sub>2</sub> net credit  
600 t CO<sub>2</sub> net req't

## Physical

800 t CO<sub>2</sub> accepted  
- 20 t CO<sub>2</sub> fugitive/vent  
780 t CO<sub>2</sub> delivered

## Credit

800 t CO<sub>2</sub> gross  
- 20 t CO<sub>2</sub> fug./vent.  
- 30 t CO<sub>2</sub> transmission  
750 t CO<sub>2</sub> net credit

## Physical

780 t CO<sub>2</sub> accepted  
- 80 t CO<sub>2</sub> vent  
700 t CO<sub>2</sub> sequestered

## Credit

750 t CO<sub>2</sub> gross  
- 80 t CO<sub>2</sub> fug./vent.  
- 70 t CO<sub>2</sub> alt. sources  
600 t CO<sub>2</sub> net credit



# How this can all play out – an alternative...

Capture

Transmission

Sequestration

## Physical

1000 t CO<sub>2</sub> produced  
200 t CO<sub>2</sub> parasitic  
800 t CO<sub>2</sub> captured

## Credit

1200 t CO<sub>2</sub> gross  
- 800 t CO<sub>2</sub> net credit  
400 t CO<sub>2</sub> net req't

## Physical

800 t CO<sub>2</sub> accepted  
- 20 t CO<sub>2</sub> fugitive/vent  
780 t CO<sub>2</sub> delivered

## Credit

- 20 t CO<sub>2</sub> fug./vent.  
- 30 t CO<sub>2</sub> transmission  
50 t CO<sub>2</sub> make up  
obligation

## Physical

780 t CO<sub>2</sub> accepted  
- 80 t CO<sub>2</sub> vent  
700 t CO<sub>2</sub> sequestered

## Credit

- 80 t CO<sub>2</sub> fug./vent.  
- 70 t CO<sub>2</sub> alt. sources  
150 t CO<sub>2</sub> make up  
obligation



# How this can all play out – as offsets... (with transfer)

Capture

Transmission

Sequestration

## Physical

1000 t CO<sub>2</sub> produced  
200 t CO<sub>2</sub> parasitic  
800 t CO<sub>2</sub> captured

## Credit/Liability

1200 t CO<sub>2</sub> gross  
- 600 t CO<sub>2</sub> net credit  
600 t CO<sub>2</sub> net req't

## Physical

800 t CO<sub>2</sub> accepted  
- 20 t CO<sub>2</sub> fugitive/vent  
780 t CO<sub>2</sub> delivered

## Credit/Liability

800 t CO<sub>2</sub> liability  
- 20 t CO<sub>2</sub> fug./vent.  
- 30 t CO<sub>2</sub> transmission  
- 50 t CO<sub>2</sub> total trans.

## Physical

780 t CO<sub>2</sub> accepted  
- 80 t CO<sub>2</sub> vent  
700 t CO<sub>2</sub> sequestered

## Credit/Liability

800 t CO<sub>2</sub> liability  
- 80 t CO<sub>2</sub> fug./vent.  
- 70 t CO<sub>2</sub> alt. sources  
- 50 t CO<sub>2</sub> total trans.  
600 t CO<sub>2</sub> net credit

# Bringing Forward the Key Issues...

- Five key groups of commercial mechanisms

Permanence,  
Measurement  
and  
Monitoring

Title and  
Liability  
Transfer

Baselines and  
Ownership of  
Emission  
Reductions

Accounting  
and Data  
Management

Emission  
Reduction  
Multipliers



# Permanence, Measurement and Monitoring...

Permanence,  
Measurement  
and  
Monitoring

- Permanence is key issue for emission reduction claim
  - Conflict with ex-poste verification requirement
  - Practical means required for handling reversals
- Measurement of SSRs through chain of custody and project cycle
  - Standardization
  - Transparency
  - Access to data for verification



# Title and Liability Transfer...



Title and  
Liability  
Transfer

- Ability to separate the physical carbon from the related liability
  - Across entities involved at each step of capture, transmission and sequestration
  - Support flexibility in commercial transactions by allowing linkage of responsibility and control
- Attribution of losses and their impact on liability
  - Control of fugitives / venting / balancing
  - Define responsibility for sources of emissions throughout project condition

# Baselines and Ownership of Reductions...



Baselines and  
Ownership of  
Emission  
Reductions

- Impact of CCS on baseline reporting
  - Ensuring transparency for offset claim to prevent crediting delays
  - Capturing multiplier effect on environmental benefits
- Ownership of capture and disposal benefits
  - Data ownership / access and reporting transparency are key
  - Link responsibility with control and decouple physical CO<sub>2</sub> from related liability

# Accounting and Data Management...

- Establishing standardized approaches that support verification
  - Common guidance and tools
    - Collection and management of data
      - Step-wise approach
    - Consistency of reporting
      - Project-level / capture site-level
  - Inclusion of emissions from all sources of emissions throughout project condition

Accounting  
and Data  
Management

Capture

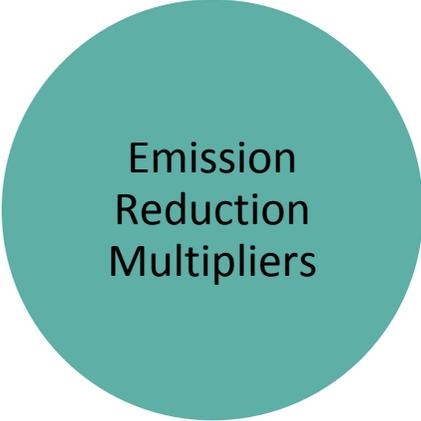
Transmission

Sequestration



**Blue Source**  
*Canada*

# Emission Reduction Multipliers...



Emission  
Reduction  
Multipliers

- Policy issue around providing the required supports for CCS
- Impact on perception of environmental integrity requires coordinated positioning
- Attribution of multipliers across value chain
  - Capture site
  - Transportation
  - Disposal site

# Mapping Outcomes...

	Permanence, Measurement and Monitoring	Title and Liability Transfer	Baselines and Ownership of Emission Reductions	Emission Reduction Multipliers	Accounting and Data Management
Policy / Advocacy					
Tools and Guidance					

# Next Steps

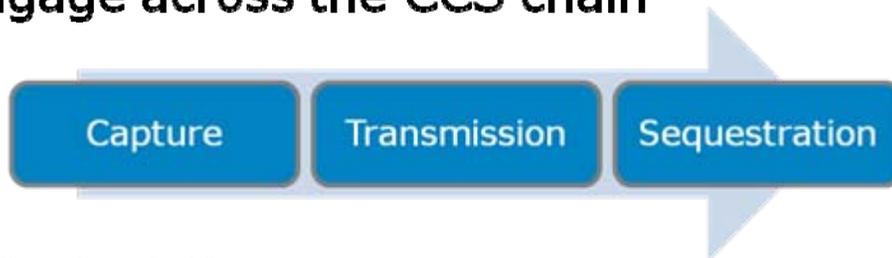
# How to ensure that all points are covered...

- **Technical considerations**

- Support the protocol development process (NACCSA, PEW, ACR)
  - Collaborative support, both funding and in-kind
  - Outreach to ensure broader stakeholder engagement
    - » Other industry groups
    - » North American partners

- **Commercial mechanisms**

- Contemplate the impact of these issues on implementation
  - Develop approach to addressing key issues
  - Integrate within advocacy framework
  - Engage across the CCS chain



# Questions?

[www.bluesource.com](http://www.bluesource.com)

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