GHG Markets and CCS – Incentive, Impediment, Irrelevant?

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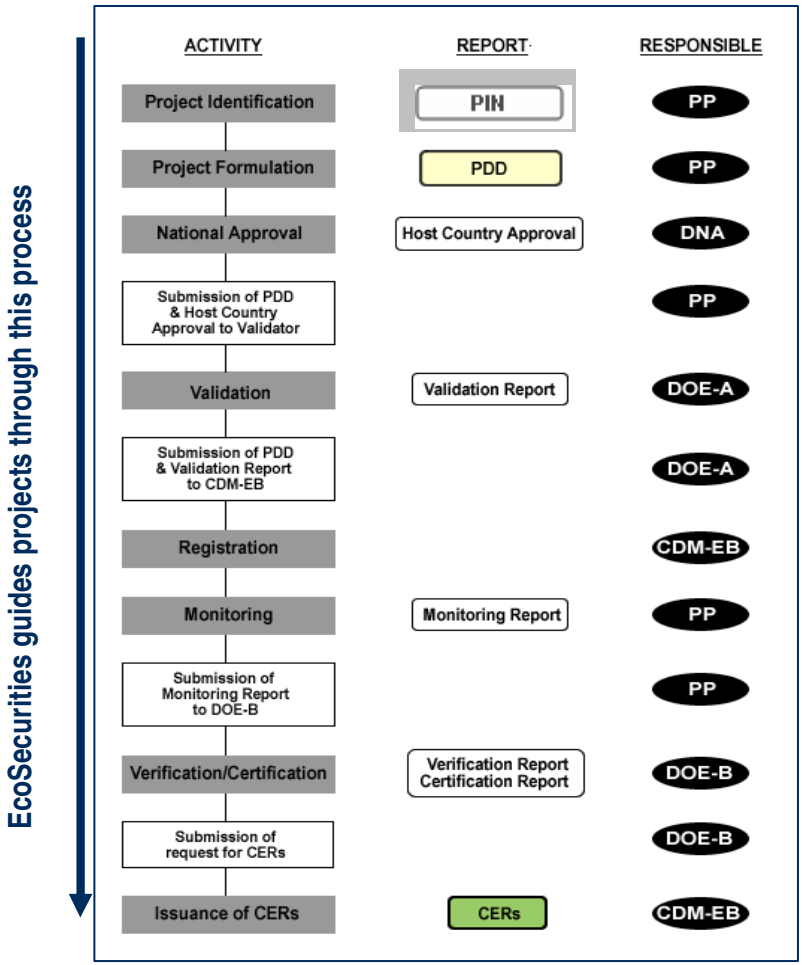
ECO SECURITIES

Originate Implement Commercialise



EcoSecurities' successful track record::

- 12 methodologies approved
- 76 projects validated
- 55 projects registered
- 283 projects financed
- 166 projects under construction or operating
- 156 million CERs expected

PIN=Project Idea Note, PDD=Project Design Document, PP=Project Participant, DNA=Designated National Authority, DOE=Designated National Authority

ECO SECURITIES

Inform Support Implement

- First Mitigation Deals in U.S. and Globally
- Leaders in Project, PDD, and Methodology Development
- Won First GHG Regulatory Proceeding
- Designed a Major GHG Early Action Crediting Program for U.S.
- Took First Company Climate-Neutral
- Completed First Major GHG Offset Portfolio
- Supported First Utility-Based GHG Business Unit
- Developed First GHG Market Supply-Demand Model
- Point Carbon - Best CDM Project Developer 2006
- Envtl Finance – Best GHG Advisory Firm 2001 - 2006

A Local Presence in a Global Market

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Portraying CCS as a Key Option

- But in What Context is CCS Being Viewed?
  - Based on current market value of EOR CO2 ($15/ton)?
  - Based on simple cost of injection of almost pure CO2 ($8-10/ton)?
  - Based on current costs of capture through storage?
    - Pulverized coal: $30-70
    - Gasified coal: $15-55
    - Natural gas: $40-90
- Do the Economics and Characteristics of CCS Fit Into Policy and Market Forecasts, and Realities of Financial Decisionmaking?

Portraying CCS as a Key Option

- Is There a Disconnect?
  - Companies and sectors pushing CCS are sometimes those least likely to be building aggressive CO2 economics in their planning
  - Companies and sectors pushing CCS are often those most aggressively pushing market mechanisms as key solution
- GHG Market Mechanisms Can be a Key Technology Driver
  - But not necessarily a near-term outcome
- But Will They for CCS?
  - What will CO2 reductions be worth? And how certain?
  - What will CCS cost as a mitigation option? And how discounted?
  - Does CCS Fit?
- Are We Assuming a Convergence of Economics?
- Or Are We Assuming Technology Mandates, or Complementary Policies?

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2. Forecasting GHG Markets

GHG Price Anticipation is Indeed Key!

Can Society Afford Emissions Targets?

Should Companies Buy Credits Today?

Should Utilities be Building IGCC Plants?

Should Projects be Selling Credits Today?

What's the Right Oil Sands Technology?

What's Plausible for Post-2012 Targets?

Will GHG Prices Promote New Technologies?

Should EU Power Plants be Fuel Switching?

Carbon Credit Price Forecasting

- While a Supply and Demand Approach Makes Sense…
  - Demand is (obviously) largely a function of policy decisions
  - But (much less obviously) so is supply
    - What is a “credit”?
    - How are “credits” quantified?

- This Makes the GHG Commodity a Very Different One
  - Price forecasting almost meaningless outside of the accompanying policy context
  - Makes it hard to think of as predictable commodity
  - Makes it hard to interpret simple targets
  - Potentially quite susceptible to market feedback effects

Examples of Price Anticipation

- A Wide Variety of "Price Signals"
  - Chicago Climate Exchange: <$5/ton
  - Current CER Prices: $5-15
  - EU ETS Price Peak in 2005: $40
  - Forecasted EU ETS Prices: $10-30
  - Voluntary Environmental Branding: $5-10
  - Macro-Economic CER Modeling for 2010: $1- 30
  - 550 ppm Stabilization Modeling: $75-100
- This Range Spans Immateriality to a Falling Sky, and a Strong Technology Driver to an Irrelevant Financial Factor

Where's Our Crystal Ball?

- Unfortunately, There Isn't One
- This Range of Estimates isn't "Wrong"
- It Reflects "Apples & Oranges" Scenarios
  - Involving policy, market, and other variables
- Where Does That Leave Us?

GHG Market Forecasting Variables

- Context Variables
  - Science, media, public opinion, policy
- Technology Variables
  - Costs, R&D spending, deployment support, mandates
- Demand Variables
  - Growth, fossil prices, targets, U.S. role, policies and measures
- Supply Variables
  - What counts, how counted, rules, behavior, psychology, hot air

GHG Market Modeling Variables

Supply Variables

- The annual rate at which projects can be validated
- The stringency of additionality rules
- When methodologies are approved for different sectors
- What regions of the world supply can come from
- When host countries are ready to approve projects
- Sector-specific technical and practical potentials, based on the latest studies and expert insight
- Sector-specific deployment rates, based on expert insight
- Sector-specific economic analysis

Demand Variables

- Global emissions growth
- Stringency of the EU ETS
- Whether, when, and the severity future targets are set
- United States participation
- How much hot air will come into the market
- The proportion of demand met through credits

Coalmine Methane Summary

Datapoint Name	Methane Reductions From Coal Mining
Sector	Methane
Region	Global

NOT USED

Technical Potential (1000 Tons CO2e)	345,000
Percentage Likely to Be Available	85%

Lowest Cost	$0.50
Highest Cost	$15.25
Cost Distribution	Low
Transaction Cost	$1.50

Lowest Additionality	1
Highest Additionality	5
Additionality Distribution	High
Additionality/Cost Correlation	20%

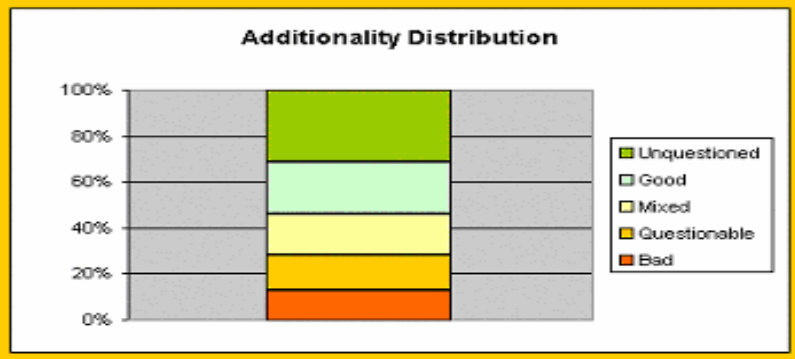
% Realized Potential	85%
Total Realized Tons (000s)	293,250
Available Cost Range	$2.00 - $16.75

* using additionality screen of '1 or above' - set on Price v. Quantity tab

Select Standard Datapoint to Retrieve:
Methane Reductions From Coal Mining

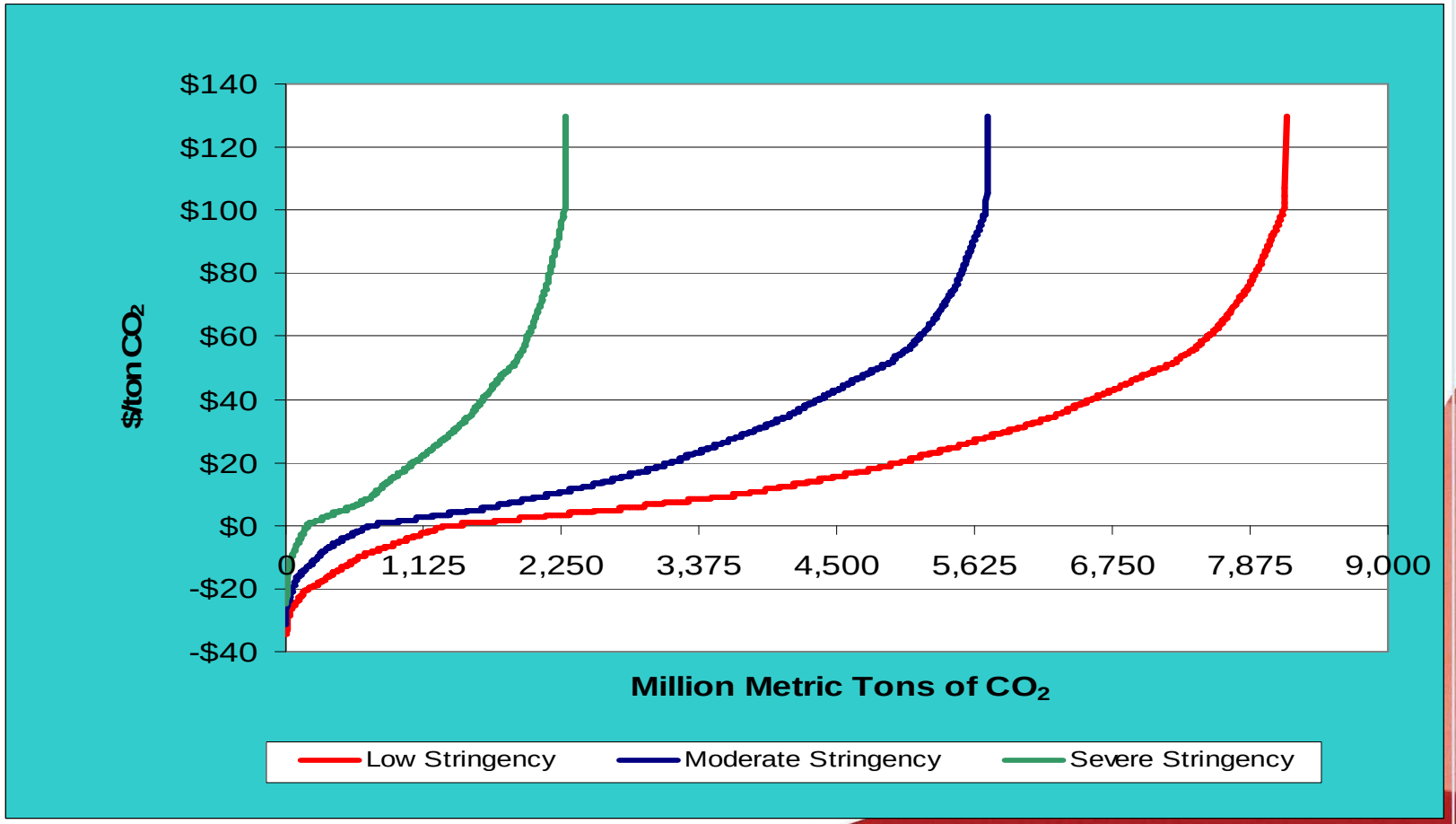
Get Datapoint | Save to Database | Return to Supply Curve

Average: $7.03



Create New

2010 GHG MAC Curve

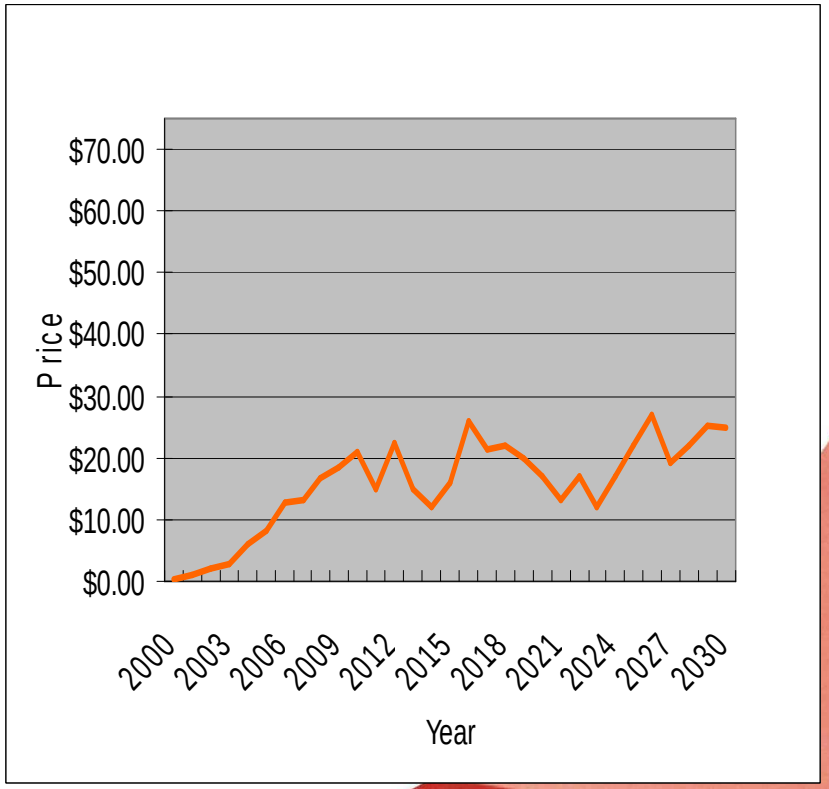


Scenario 1 – Policy “Collapse”

- Major Political and Economic Challenges
- Could Challenges Lead to Collapse of Int'l and Domestic Policy Momentum?
  - Absent a scientific reversal, hard to see
  - Broad public support for action on this issue
- The Odds: Low
- Note: Scenario Subject to Sudden Reversal

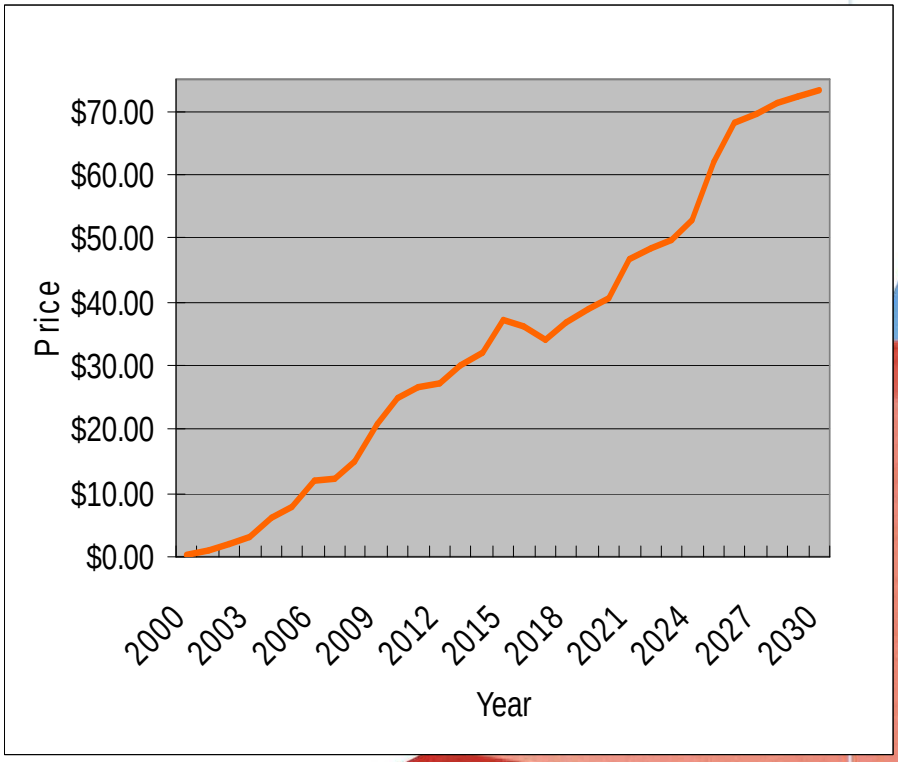
Scenario 2 – Political Status Quo

- Issue is Here to Stay
  - Numerous policies and measures pursued
- Will Affect Many Sectors in Material Ways
  - Range of Cost Estimates: \$5-30/ton CO_2
- But Policy Unable to Achieve CO_2 Stabilization
- The Odds: High
- Note: Scenario Subject to Sudden Reversal

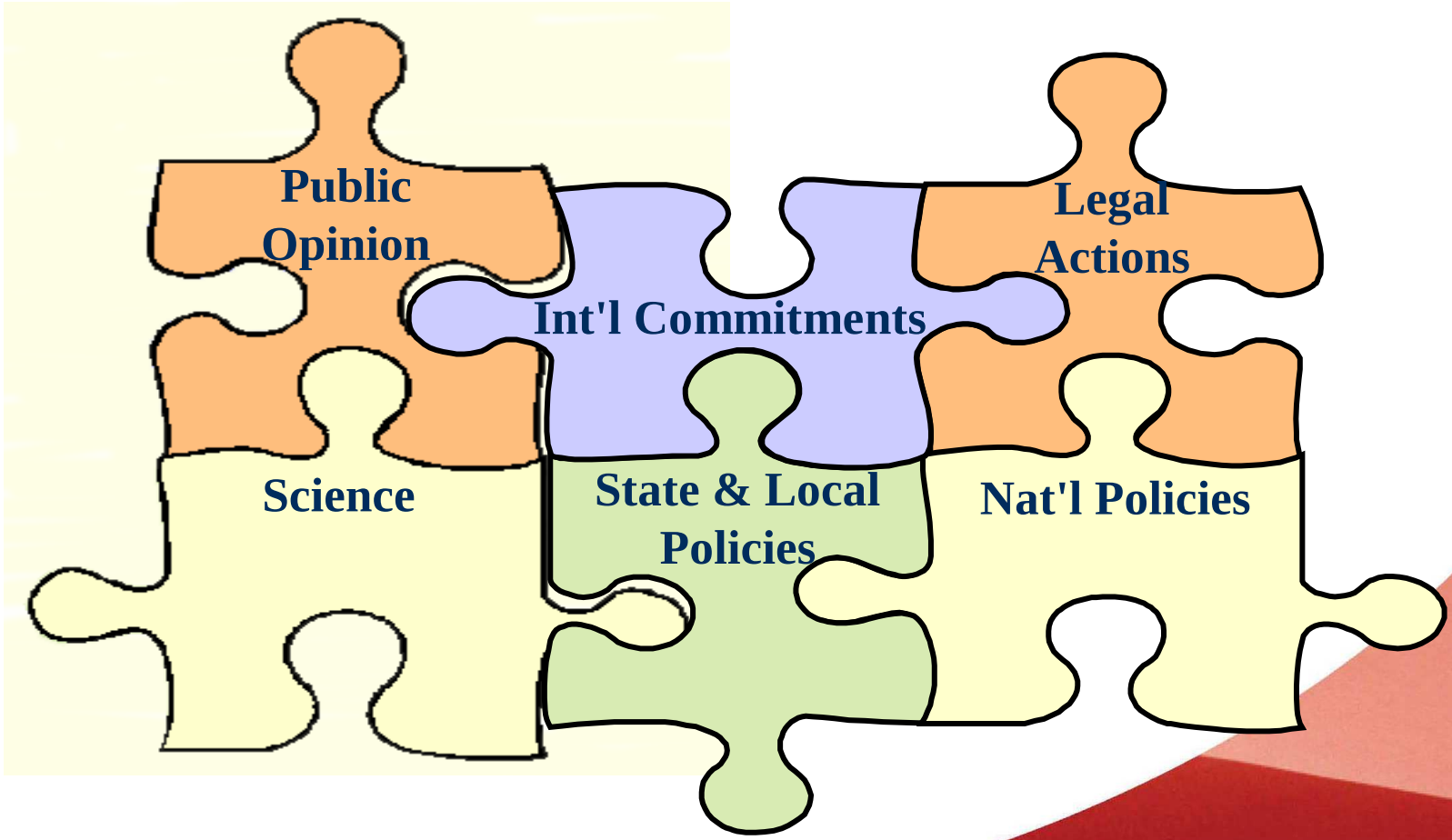


Scenario 3 – Atmospheric Stabilization

- Political Will Exists to Tackle
  - Aggressive emissions reductions
  - Aggressive technology development
  - Aggressive reliance on GHG markets
- Would Significantly Affect Economics
  - Stanford Modeling Forum: $75-100/ton CO_2
- The Odds: Modest



Will The Pieces Fall Into Place?



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How to Think About CCS

- A Key Factor in GHG Market Demand?
  - Are we assuming simple CCS mandates?
- A Key Factor in GHG Market Supply?
  - Are we assuming CCS is part of the larger supply curve, and will compete in those markets?
- Is CCS Susceptible to GHG Market Uncertainties?
  - Timing, risks, capital commitments?
  - Risk of feedbacks: CCS mandates = lower CO2 prices = larger gap
- Is CCS Competing With Other “Disruptive” Mitigation Technologies
  - Technologies like ocean fertilization?
- And if Price Signal Isn’t Sufficient, Should We Push Complementary Measures, or Push for a Higher Price Signal?

Will GHG Markets be Pivotal?

Case	2020 Estimate, CO_2 Value	CO_2 Driver for IGCC and Capture	Promote IGCC?
Political Status Quo	$10-30	~$38-42	Unlikely in this timeframe
Aggressive Policy	$25-50	~$38-42	Likely with aggressive policy

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Structuring a Strategy for Advantage

Where companies increasingly should be

Structuring a Strategy for Advantage

> You Can't Get There Without A View of Future GHG Prices

Structuring a Strategy for Advantage

So When and If We Resolve the Technical Issues, How Should We Be Anticipating CCS's Role in Future Markets and Business Decisions?

For More Information

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