Cadmus & Synapse Presenters

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Cadmus

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Synapse
Agenda

• Welcome & Introductions
• Project Overview & Today’s Goals
• Review Initial Policy Findings
• Preview Policy Evaluation and Modeling
• Questions and Feedback
Introductions
Participating Agencies
About Cadmus

Since 1983
Employee-owned social good consultancy

36 Years
Of helping our clients address complex challenges in a highly collaborative environment

Started with 2 Co-Founders,
550+ strong as of 2020

16 Offices
Synapse

- Founded in 1996 by CEO Bruce Biewald
- Leader for public interest and government clients in providing rigorous analysis of the energy sector
- Staff of 35 includes experts in energy and environmental economics and environmental compliance
- Recent relevant experience with MA Comprehensive Energy Plan, Burlington (VT) Net Zero 2030 Roadmap, Building Decarbonization in California, Transforming Transportation in New York, Northeast Regional Assessment of Strategic Electrification
- Project team: Dr. Asa Hopkins, Pat Knight, Jamie Hall, Jason Frost, Ben Havumaki, Kenji Takahashi, and others
Poll: What organization do you represent?

A. Private company or trade association
B. Nonprofit or academic
C. Government
D. Individual
E. Other
Project Overview
Project Goal and Deliverables

Project Goal
To investigate potential state and regional carbon pricing policies.

Final Deliverables
A report and associated presentation that outline key findings from the policy analysis, modeling and stakeholder engagement.

The purpose of this study is to provide an impartial assessment of various carbon pricing policies. It is intended to inform, not set, final policy design.
Three Focal Sectors
The study will focus on three focal sectors that account for 86% of GHG emissions in Rhode Island.
## Looking Forward

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<th>Tasks</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
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<td>Task 1. Project Management</td>
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<td>Task 2. Literature Review and Policy Selection (Complete)</td>
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<td>Task 3. Policy Analysis</td>
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<td>Task 5. Stakeholder and EC4 Engagement</td>
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<td>Task 6. Final Report and Public Presentations</td>
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Initial Policy Findings
Poll: How familiar are you with carbon pricing?

A. Expert
B. Familiar
C. Somewhat familiar
D. Not very familiar
E. New to carbon pricing
Policy and Literature Review

What was reviewed?
- Existing policies
- Studies on carbon pricing
- Proposed legislation
- Complimentary policies

46 national and 31 subnational jurisdictions have implemented or scheduled carbon pricing initiatives

Factors Examined
- Sectors covered
- Program longevity
- Pricing mechanism
- Pricing levels
- GHG reductions
Role of a Carbon Price

Disincentive

Drives a change in behavior or operations due to a higher cost of consuming fossil-based energy

The Energy System

Stick

Carrot

Incentive

Generates revenue for investing in greenhouse gas reduction programs

Greenhouse Gas Emissions Reductions
Carbon Pricing Programs

**Cap-and-Trade**
- Cap total emissions
- Tradeable emissions allowances
- Carbon price set by market forces
- Certainty on total emissions
- Generates revenue for investment or rebates

**Carbon Fee**
- Set fee per ton of CO2e
- Carbon price set by administrator
- Certainty on price
- Less certainty on emissions
- Generates revenue for investment or rebates

Rebates, such as a dividend or tax reduction, offset the costs incurred by the application of a fee or cap-and-trade program.
# 2020 Pricing Levels of Current Programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Type of Program</th>
<th>Focal Sectors Covered</th>
<th>Current Pricing Level (per metric ton CO2e)</th>
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<tbody>
<tr>
<td>Japan</td>
<td>Carbon Fee</td>
<td>🛠️ 🕯️ 🍃</td>
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<tr>
<td>Regional GHG Initiative (RGGI)</td>
<td>Cap-and-Trade</td>
<td>🕯️</td>
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<td>Transportation Climate Initiative (TCI)</td>
<td>Proposed Cap-and-Trade</td>
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<td>Northwest Territories</td>
<td>Carbon Fee + Rebate</td>
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<td>European Union ETS</td>
<td>Cap-and-Trade</td>
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<td>British Columbia</td>
<td>Carbon Fee + Rebate</td>
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<tr>
<td>Sweden</td>
<td>Carbon Fee</td>
<td>🛠️ 🕯️ 🍃</td>
<td>$123</td>
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# Case Study: California Cap-and-Trade

## Background
- Started in 2013 as part of larger climate change policy
- Broadest cap-and-trade program in the world
- Linked to Quebec (2014)
- Current Price is $18

## Program Details
- Primarily covers transportation, electric, thermal, industry
- Covers about **85%** of GHG emissions
- Revenue is invested into efficiency and clean energy programs

## Outcomes
- Raised **$9.3B** for investment
- Emissions declined **16%**
- **33.2%** growth in advanced energy jobs

## Key Lessons
- Investment of revenue is a key part of program success at lower price levels
- Comprehensive GHG programs can be effective in reducing GHG emissions while preserving economic growth
## Case Study: Swedish Carbon Fee

### Background
- Implemented as part of 1991 national tax reform
- Initially set at $28 per metric ton CO2e
- Current price is about $123

### Outcomes
- Emissions declined by 26%
- 54% of final energy use is renewable

### Program Details
- Primarily covers transport and building thermal
- Covers about 40% of GHG emissions
- Revenue is not invested and applied to the general fund (reducing other taxes)

### Key Lessons
- High price can be effective in reducing GHG emissions while preserving economic growth, even without investment
- Limited scope limits total impact
Clarifying Questions
Policy Evaluation and Modeling
Analytical Approach

Select and Define Illustrative Policy Cases

Stakeholder Engagement

Conduct Quantitative Impacts Modeling

Assess Potential Policy Based on Key Criteria

Stakeholder Engagement

Synthesize Results

Stakeholder Engagement
Selecting Pricing Levels to Study

Pricing levels are meant to be illustrative and informative for the study.

**Low Price**

- Generates revenue for investing in decarbonization programs
- Applied to specific sectors
- $6 per metric ton of CO$_2$e in 2021
- Increasing 5% annually above rate of inflation
- Price corresponds to RGGI
- GHG reductions will be driven by reinvestment

**High Price**

- Provides a mechanism to change behavior
- Applied to all sectors
- $25 per metric ton of CO$_2$e in 2021
- Increasing 5% annually above rate of inflation
- Price corresponds to EU ETS
- GHG reductions driven by both reinvestment and behavior change
- Rebate to return some funds to RI citizens
Contextualization: Impact on Gas Prices

Price (Per Gallon of Gasoline)

- Peak Price (2013)
- Current Price
- 5 Year Average (2015 - 2019)
- 5 Year Average with $6 Carbon Price
- 5 Year Average with $25 Carbon Price

Regular Gas Price

Carbon Price

- $0.05
- $0.23
Pricing Levels Over Time

- Low Price
- High Price

Carbon Price (per Metric Ton CO2e)

- $0.00
- $20.00
- $40.00
- $60.00
- $80.00
- $100.00
- $120.00

Year:
- 2021
- 2025
- 2030
- 2035
- 2040
- 2045
- 2050
Poll: From your perspective, please rate the appropriateness of the *low price* for this study?

A. It seems about right
B. It is too low
C. It is too high
Poll: From your perspective, please rate the appropriateness of the *high price* for this study?

A. It seems about right
B. It is too low
C. It is too high
Scenario 1: Low CO₂ Price – Transportation

Low price applied to the transportation sector

- **Transportation and Climate Initiative**
  - Proposed cap-and-invest program
  - Aligns with estimated starting price range: $6 to $22
  - Regional cooperation

- **Transportation Investment**
  - Incentives for light duty zero emissions vehicles (ZEV)
  - Low carbon and ZEV buses, trucks, freight programs
  - Public transit
  - Active transportation

- **Goals Informed by recent Decarbonization Studies**
  - Transportation and Climate Initiative preliminary analysis (2019)
  - RI Greenhouse Gas Emissions Reduction Plan (2016)
  - Deeper Decarbonization in the Ocean State (2019)
Poll: Which investment category is most important to you?

A. Incentives for light duty zero emissions vehicles (ZEV)
B. Low carbon and ZEV buses, trucks, freight programs
C. Public transit
D. Active transit
E. Other
Scenario 2: Low CO$_2$ Price – Building Thermal

Low price applied to the thermal sector

- Study to differentiate impacts on residential and commercial subsectors
- Regional Cooperation

**Thermal Investment**
- Energy efficiency
- Carbon-reducing heating equipment incentives (e.g., heat pumps)
- Rhode Island Low Income Home Assistance Program (LIHEAP) or similar program

**Goals Informed by Decarbonization Studies**
- Deeper Decarbonization in the Ocean State (2019)
- Heating Sector Transformation in Rhode Island (2020)
Poll: Which investment category is most important to you?

A. Energy efficiency
B. Carbon-reducing heating equipment incentives (e.g., heat pumps)
C. Rhode Island Low Income Home Assistance Program (LIHEAP) or similar program
D. Other
**Scenario 3: High CO$_2$ Price and Rebate**

High price applied to transportation, thermal, and electricity sectors

- **Regional Cooperation**

- **Investment**
  - Investment is assumed to occur at the same levels as the low price scenarios
  - Current RGGI investments used for electric sector

- **Rebate**
  - Total amount available for rebate is any revenue remaining after investment
  - Policy analysis will review different rebate approaches
Clarifying Questions
Policy Assessment

Qualitatively assess policy scenarios on several criteria

- Projected carbon reduction potential
- Political and technical feasibility
- Implementation costs
- Costs and benefits to residents
- Health and economic impacts
- Alignment with existing initiatives
- Extent of need for regional participation
- Social Equity
Modeling Approach
Carbon pricing policies impact energy system through two mechanisms: **elasticity of demand**, and **programmatic investment**.

- Low prices primarily impact energy use by **programmatic investment**
  - E.g., transportation-sector funding spent on EV incentives, EV infrastructure, transit, etc.
  - Model using consumer adoption models (e.g., MA3T)

- Higher prices will **also** have an impact through **elasticity of demand**
  - Consumers use less of a fuel as it gets more expensive
  - Near term behavioral change (e.g., driving less, choosing to telework)
  - Longer term investment choices (e.g., which vehicle to buy, or whether to buy one at all)
  - Model with Carbon Tax Assessment Model
4. Model Impact of Carbon Pricing and Investment

- E.g., vehicle investment choices are driven by the combination of relative fuel prices (elasticity) and availability of incentives and fueling infrastructure (programmatic)
- Track stock and use of vehicles and building equipment using Synapse’s EV-REDI, Building Decarbonization Calculator, and M-SEM tools
- Evaluate economic impacts with IMPLAN, supplemented with “example household” analysis

Integrate the results into self-consistent pictures of Rhode Island in each policy case

Example: New York electrification analysis
Next Steps
We Welcome Your Input

Please send your feedback to:

• **Jesse Way**, of *Cadmus*, ([jesse.way@cadmusgroup.com](mailto:jesse.way@cadmusgroup.com));

• **Chris Kearns**, of *the Rhode Island Office of Energy Resources* ([christopher.kearns@energy.ri.gov](mailto:christopher.kearns@energy.ri.gov));

• **Elizabeth Stone**, of *the Rhode Island Department of Environmental Management* ([elizabeth.stone@dem.ri.gov](mailto:elizabeth.stone@dem.ri.gov)).

Please submit your feedback and questions by **Friday, May 29**. Thanks!

**Key Feedback Questions**

• Are the carbon prices set at appropriate levels for this study?
• How should revenue investment be prioritized in the transportation and building thermal sectors?
• Is there additional criteria that should be assessed in the qualitative policy analysis?
Thank You

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Questions?