

# The Influence of a CCS Information-Session on Public Perception

Twin River Energy Center, Wiscasset, Maine

**Jennie Stephens and Jeff Bielicki**

Energy Technology Innovation Policy, Harvard Kennedy School



Presented at  
Harvard Public Perception of CCS Workshop  
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## **Acknowledgements**

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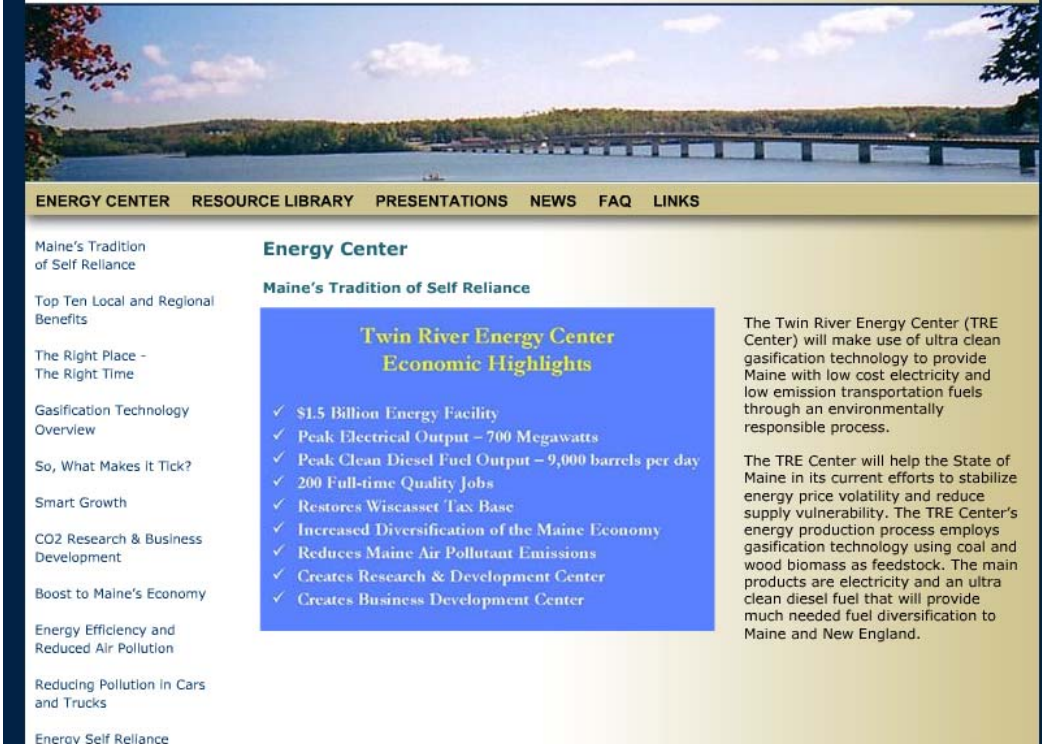
# Twin River Energy Center, Proposed Coal Gasification Plant in Maine

## Gasification/Co-production

- Coal & wood
- Produce electricity & diesel fuel

## On former Maine Yankee site

- Former coal plant then nuclear plant
- Attractive site
  - infrastructure



The screenshot shows the website for the Twin River Energy Center. At the top is a navigation bar with links: ENERGY CENTER, RESOURCE LIBRARY, PRESENTATIONS, NEWS, FAQ, and LINKS. Below the navigation bar is a header section titled "Energy Center" with the sub-header "Maine's Tradition of Self Reliance". The main content area features a blue box titled "Twin River Energy Center Economic Highlights" containing a list of seven bullet points with checkmarks. To the right of this box is a text block describing the project. On the left side of the page, there is a vertical sidebar with various menu items.

**ENERGY CENTER** RESOURCE LIBRARY PRESENTATIONS NEWS FAQ LINKS

Maine's Tradition of Self Reliance

Top Ten Local and Regional Benefits

The Right Place - The Right Time

Gasification Technology Overview

So, What Makes it Tick?

Smart Growth

CO2 Research & Business Development

Boost to Maine's Economy

Energy Efficiency and Reduced Air Pollution

Reducing Pollution in Cars and Trucks

Energy Self Reliance

**Energy Center**

Maine's Tradition of Self Reliance

**Twin River Energy Center Economic Highlights**

- ✓ \$1.5 Billion Energy Facility
- ✓ Peak Electrical Output – 700 Megawatts
- ✓ Peak Clean Diesel Fuel Output – 9,000 barrels per day
- ✓ 200 Full-time Quality Jobs
- ✓ Restores Wiscasset Tax Base
- ✓ Increased Diversification of the Maine Economy
- ✓ Reduces Maine Air Pollutant Emissions
- ✓ Creates Research & Development Center
- ✓ Creates Business Development Center

The Twin River Energy Center (TRE Center) will make use of ultra clean gasification technology to provide Maine with low cost electricity and low emission transportation fuels through an environmentally responsible process.

The TRE Center will help the State of Maine in its current efforts to stabilize energy price volatility and reduce supply vulnerability. The TRE Center's energy production process employs gasification technology using coal and wood biomass as feedstock. The main products are electricity and an ultra clean diesel fuel that will provide much needed fuel diversification to Maine and New England.


<http://www.twinriverenergy.com/>

# Developers Include CCS in Twin River Proposal

- Initial proposal mentions: CO<sub>2</sub> R&D Center

The R&D and The Business Development Centers  
Advances Clean Energy Development

- ✓ **Research:** CO<sub>2</sub> Uses and Sequestration, Hydrogen, Biodiesel and Clean Fuel Blends, Diesel Hybrid Vehicles
- ✓ **Development:** Wood Gasification, Byproduct Markets, Clean Fuels Markets
- ✓ **Diversification of the Maine Economy**



Twin River Energy Center

The map shows a green area labeled 'R&D Center' and a yellow area labeled 'Gasification Center'. A red circle highlights a building within the R&D Center. The map also shows a body of water and a road.

## Strategy #4 – Carbon Capture Technology

The capture technology employed by the TRE Center is well proven, but several other technologies are still under development. Gasification allows for easier and more economical capture than conventional power plants and co-production is even better positioned, because it is designed for CO<sub>2</sub> capture.

Locking up, or sequestering, CO<sub>2</sub> in a way that it will not be released into the atmosphere requires further research and development. CO<sub>2</sub> can also be used in some applications that would otherwise use energy that would produce CO<sub>2</sub>. The TRE Center plans on a companion R&D Center to participate in CO<sub>2</sub> research. When carbon sequestration is further developed and proven, the TRE Center will be ready to employ the technology.

## Strategy #5 – R & D Technology Center

The establishment of the Twin River Energy R&D Center will provide a venue for the advancement of CO<sub>2</sub> reduction and sequestration technology. However, until sequestration technologies are proven to be economically competitive, they will not be adopted around the world.

<http://www.twinriverenergy.com/images/pdf/7-24-07%20PP%20Wiscasset%20Presentation.pdf>

- **Later in public debate:** Developers claim they will add “25% Capture,” (CO<sub>2</sub> separation necessary for diesel fuel production), but no specific plans for CO<sub>2</sub> storage

# Chewonki Foundation CCS Seminar

October 24, 2007, Wiscasset, Maine

**Goal:** *Provide key stakeholders, decision-makers, and the public with information regarding CCS technologies and opportunities*

## Day Speakers (Invitation Only):

- David Littell (Maine Commissioner of the Department of Environmental Protection)
- Joe Chaisson (Clean Air Task Force)
- Eric Larson (Princeton University)
- Howard Herzog (MIT)
- Jennie Stephens (Clark & Harvard)
- Jay Braitsch (DOE)
- Ken Hnottavange-Telleen (Schlumberger Carbon Services)
- Sarah Forbes (Potomac-Hudson Engineering)
- David Grogan (Twin River Energy)

**Over 100 stakeholders attended**

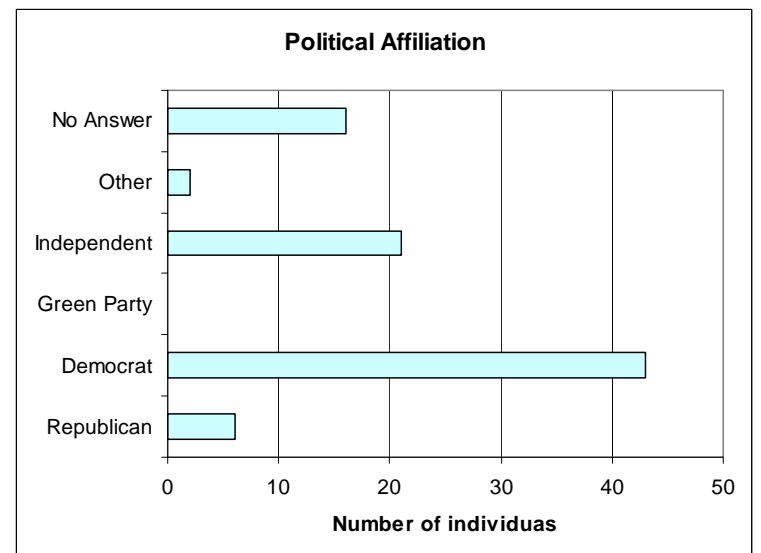
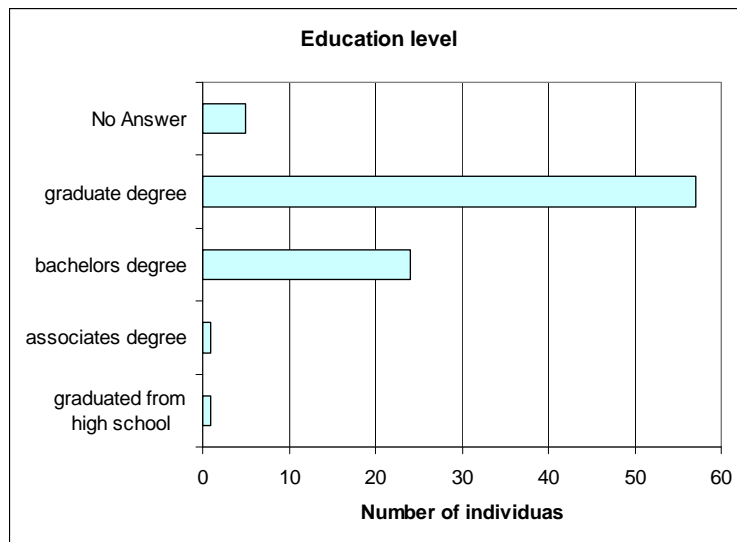
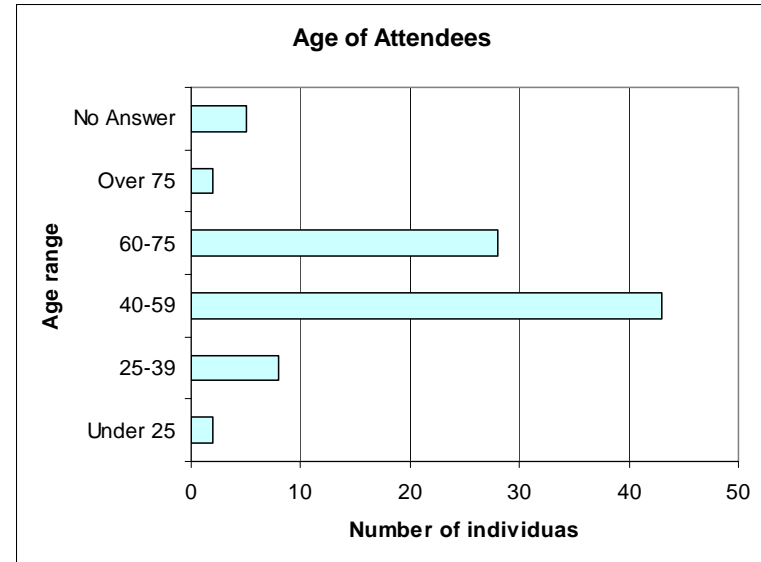
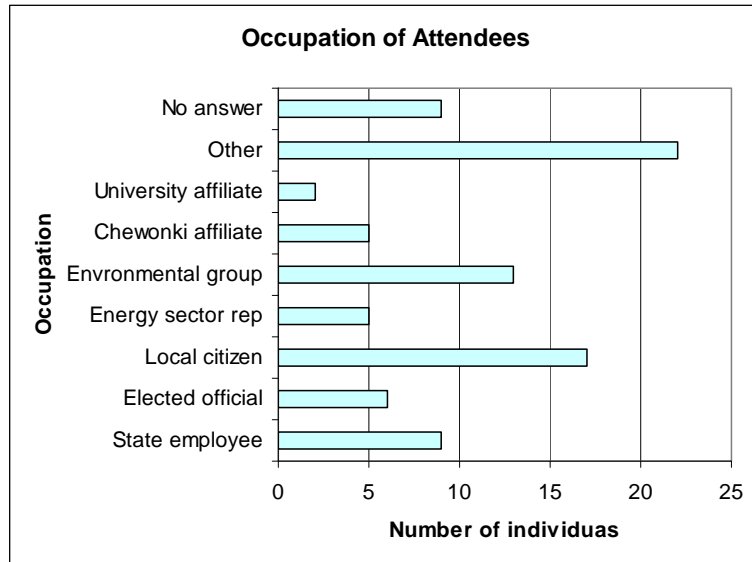
## Evening Panelists (Open to Public)

- Jennie Stephens (Clark & Harvard)
- Sarah Forbes (Potomac-Hudson Engineering)
- Grant Bromhal (NETL)
- Jeff Bielicki (Harvard University)
- Jay Braitsch (DOE)

**~40 in attendance**

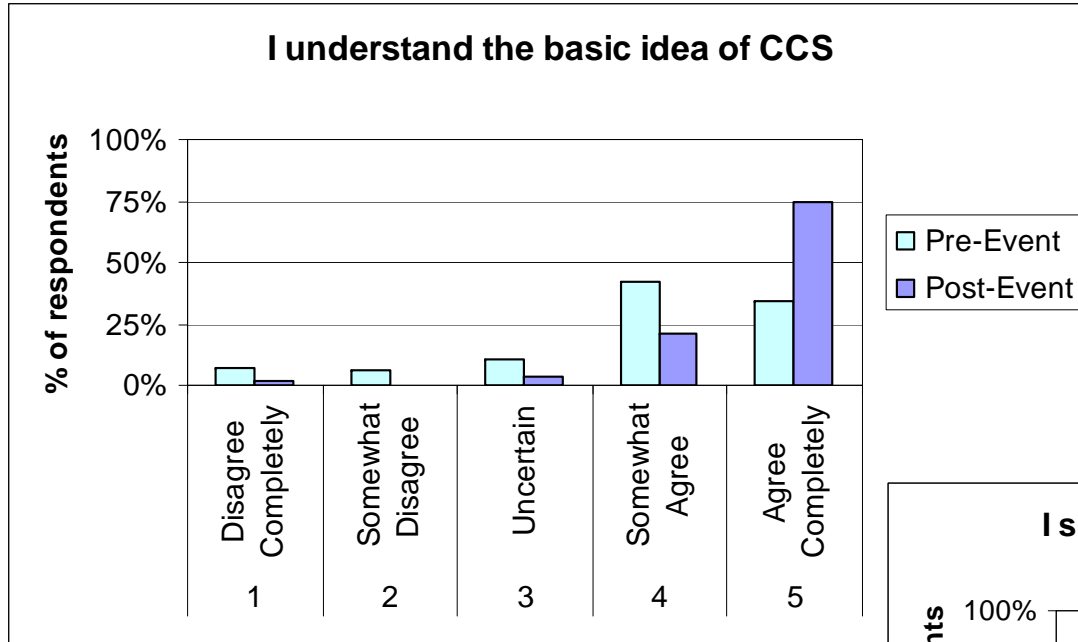
**Unique CCS Educational Event:** We developed and implemented surveys (before and after day-long event) to gain insights on perceptions and learning on CCS.

# Demographics of Attendees of Day-Long Seminar

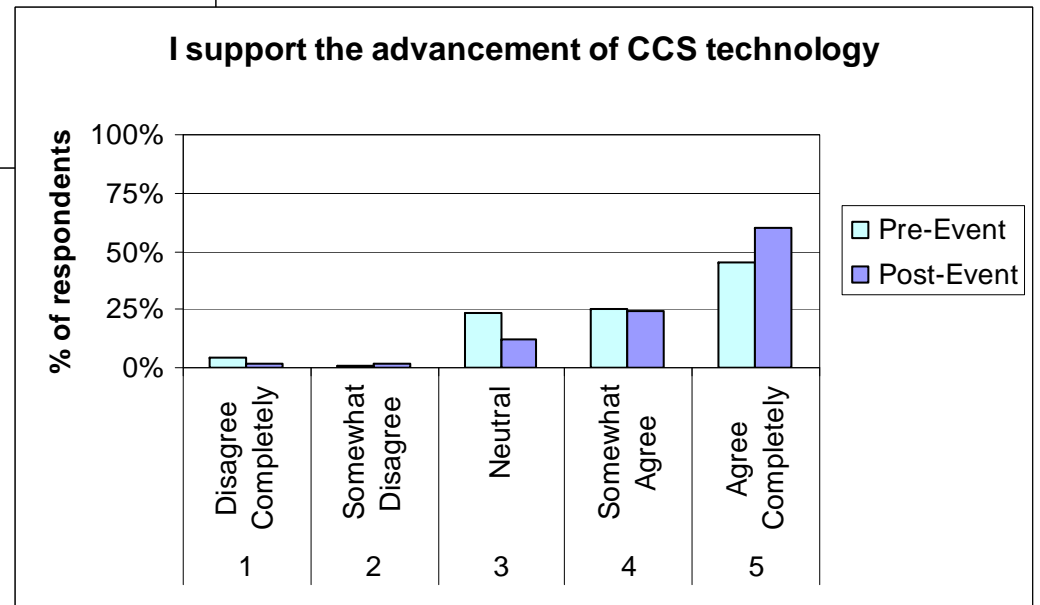


Over 100 Attendees: 89 filled out pre-surveys, 57 of the 89 also filled out post-surveys.

# CCS Understanding and Support



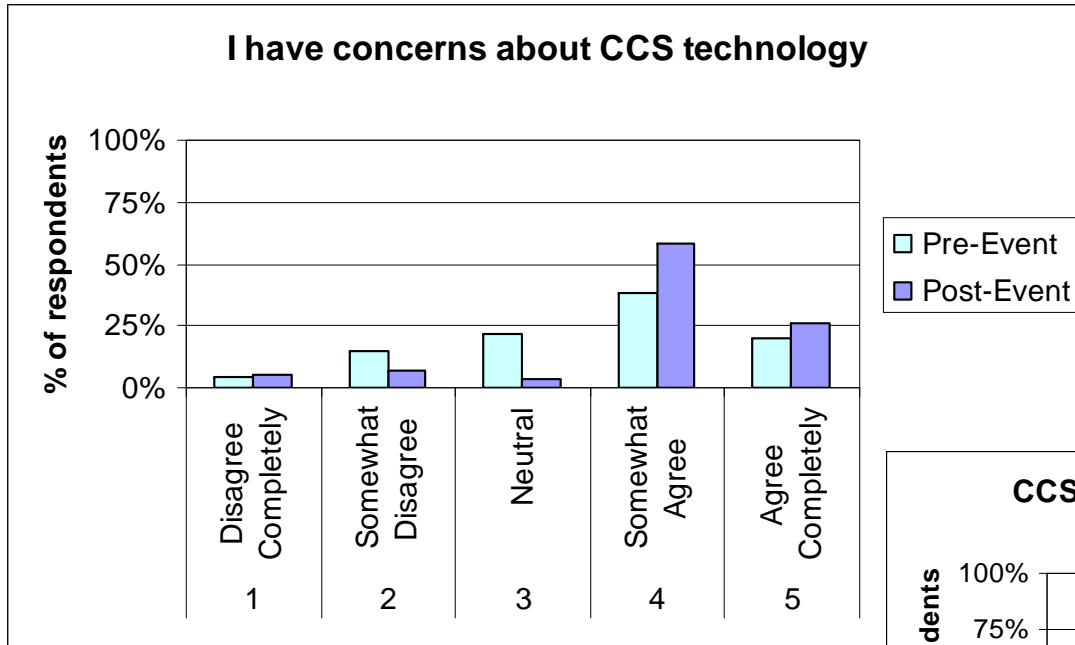
**Respondents reporting that they understood CCS increased<sup>1</sup>**



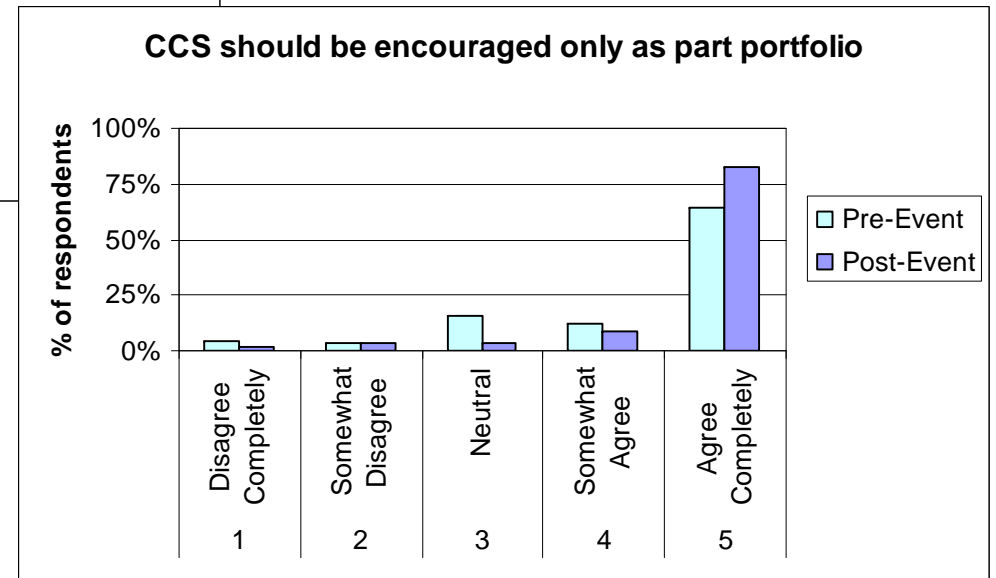
**Respondents reporting that they support the advancement of CCS increased<sup>2</sup>**

Wilcoxon signed-rank tests: <sup>1</sup>( $p < 1\%$ ) <sup>2</sup>( $P < 5\%$ ) applied to 57 (of 89) respondents who completed both pre- and post- surveys.

# CCS Concerns and CCS as Part of a Portfolio



**The level of reported concern for CCS did not change significantly.**



**Respondents reporting that CCS should be part of a portfolio increased somewhat.<sup>1</sup>**

Wilcoxon signed-rank tests: <sup>1</sup>(p<10%) applied to 57 (of 89) respondents who completed both pre- and post- surveys.

# Pairwise Correlations

	Before				After			
Understand	U							
Support	+++	S						
Concerns			C					
Portfolio	+		+++	P				
Understand	+	+			U			
Support	+	+++			+++	S		
Concerns			++					C
Portfolio				+++				++

Diagram annotations: A red arrow points from the '+++' in the 'Before' Concerns-Portfolio cell to the '+++' in the 'After' Concerns-Understand cell. A blue arrow points from the '+++' in the 'Before' Support-Understand cell to the '+' in the 'After' Support-Understand cell. A blue arrow points from the '+++' in the 'Before' Portfolio-Concerns cell to the '++' in the 'After' Portfolio-Concerns cell. A yellow dashed circle highlights the '+++' in the 'Before' Portfolio-Concerns cell. A yellow dashed circle highlights the '++' in the 'After' Portfolio-Concerns cell. A yellow dashed circle highlights the '+++' in the 'After' Support-Understand cell. A yellow dashed circle highlights the '++' in the 'After' Portfolio-Concerns cell.

+++ = positive correlation < 1%; ++ = positive correlation < 5%; + = positive correlation < 10%

1. **Concerns become correlated with Understanding.**
2. **Support is never correlated with Portfolio, but Concerns and Portfolio remain correlated.**
3. **Understanding and Support remain correlated.**
4. **Support becomes less (or un-) correlated with prior Understanding.**
5. **Portfolio becomes uncorrelated with prior Concerns.**



# Some Additional Correlations related to Demographics

After the event, level of **understanding, support and concerns** are positively correlated with level of **education**, but not before.

Age becomes positively correlated with support and negatively correlated with Portfolio

# Responses to open-ended questions about benefits and risks

## Benefits/Advantages

- Reduce CO<sub>2</sub> or GHGs for climate change mitigation
- Necessary for future of coal
- Help developing countries reliance on coal (China and India)
- Bridge technology, allows flexibility during transition
- Allows for sustained high energy consumption
- Helps energy security, domestic resource
- Reduces other pollutants in coal
- Jobs
- No benefits

## Risks/Concerns

- Sustaining coal, fossil fuels
- Distracting from simpler alternatives, renewables
- Leakage, impermanence
- Enabling environmental degradation of coal mining and transport
- Costs, expensive
- False sense of security, reduce urgency of others
- Energy intensive
- Distribution of storage locations minimal
- Groundwater contamination
- Doubt in scaling up, technical feasibility, timeframe
- No risks

“This was one of the highest quality science-based forums I have ever attended in Maine. The people of Wiscasset heard loud and clear that while full carbon capture and sequestration are key components of national and global efforts to address climate change, Maine is just not ready and may never be the appropriate place for this technology.”

-Sean Mahoney, Conservation Law Foundation (CLF) Vice President

“If it can store 25 percent of the carbon dioxide it generates, Twin River could have about the same impact on global warming as if it used natural gas and oil instead of coal, according to a study that the developer released at Wednesday's forum. It's unclear where the carbon dioxide would be stored, however.”

- Portland Press Herald, October 25, 2007

# Timeline

**Early 2007:** Twin River Energy Center Project Proposed. Series of public meetings with developers. Controversy arises. CCS is brought up in controversy

**October 24, 2007:** Chewonki Foundation hosts CCS educational seminar

**November, 2007:** Wiscasset residents voted against a height variance to allow the project to proceed.

**April 2008:** Maine enacts temporary ban on coal plants by requiring the Maine Board of Environmental Protection to create standards for the emission and capture of carbon dioxide by August 2011.