

# ***Financing Commercial Projects with CCS***

***Views on Government Measures to Reduce Commercial Risks with CCS***



**UNECE  
Ad Hoc Group of Experts on Clean Coal**

*Geneva  
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Legal / Regulatory Team:  
Fred Eames, Scott J. Stone  
CCS Alliance  
Hunton & Williams LLP  
Washington, DC  
202-419-2160  
sstone@hunton.com

**Dr. Maria Dubravka Pineda  
Energiz / UCLA Energy Forum  
Washington, DC  
202-460-8269  
mdpineda@gmail.com**

Andrew D. Paterson  
CCS Alliance  
Washington, DC  
619-807-3267  
adpaterson@gmail.com

## Opening Observations

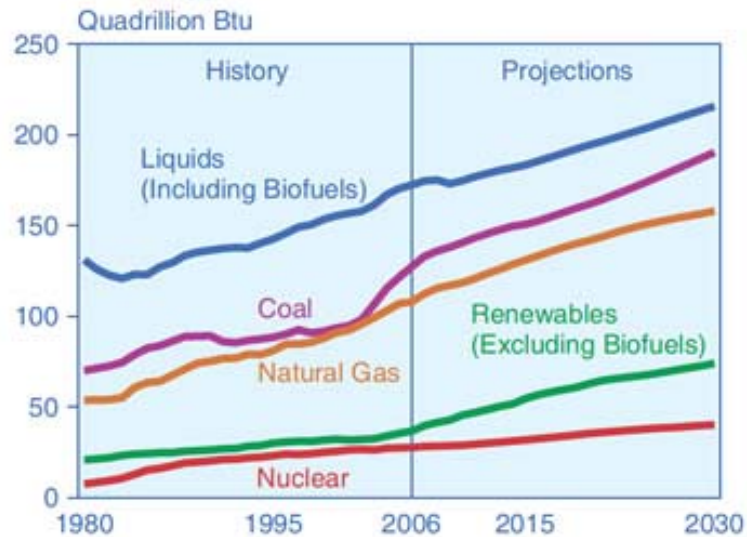


1. Global energy use cannot be curbed as much as GHG emissions by 2030: need to change the way energy is used- carbon management (CCS) enables more efficient use of fossil fuels.
2. Commercial plants and projects with CCS are not being built (except with EOR) for several reasons: not just elevated costs, but higher risks to more stakeholders also.
3. Subsidies are NOT enough to get plants built; market uncertainties and emissions regulations and subsurface rules must be addressed as well.
4. “Bridging the Commercial Gap” will require a **negotiation of cost-sharing and risk-sharing** between public and private sectors.
5. Dealing with just *some* elevated costs and higher risks of first plants will not promote commercial deployment. Financing industrial plants is like a rocket launch: **all risks must be covered**.
6. Stove-piping sectors- power, energy and chemicals -hinder best use of a broader industrial base with varying access to capital to deploy CCS.
7. A more resilient 21<sup>st</sup> C industrial base CAN be built, by drawing on broader industrial experience and engineering know-how.
8. Bridging the commercial gap entails more industrial cross-uses and joint ventures. (*Drilling technology in oil sector to power plant CCS; gasification from chemicals to power*)

# EIA International Energy Outlook 2009

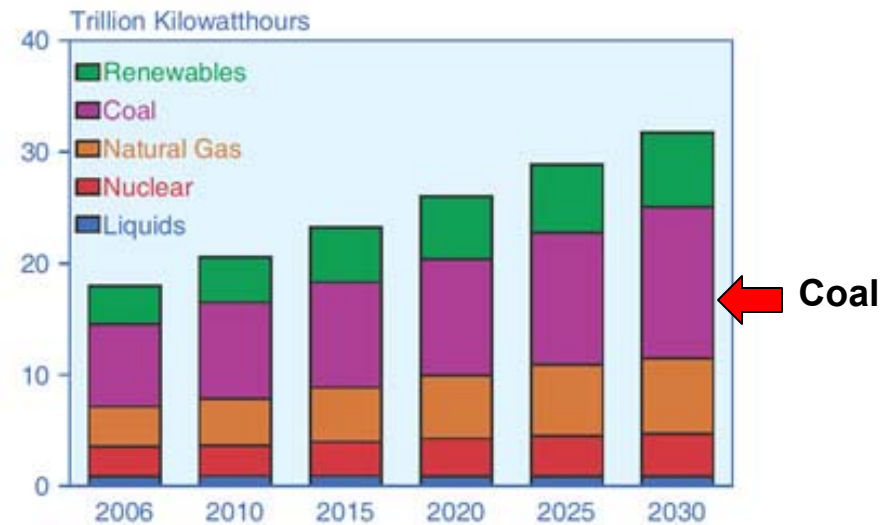
Coal remains an expanding portion of energy supply through 2030.

Figure 14. World Marketed Energy Use by Fuel Type, 1980-2030



Sources: **History:** Energy Information Administration (EIA), *International Energy Annual 2006* (June-December 2008), web site [www.eia.doe.gov/iea](http://www.eia.doe.gov/iea). **Projections:** EIA, *World Energy Projections Plus* (2009).

Figure 16. World Electricity Generation by Fuel, 2006-2030



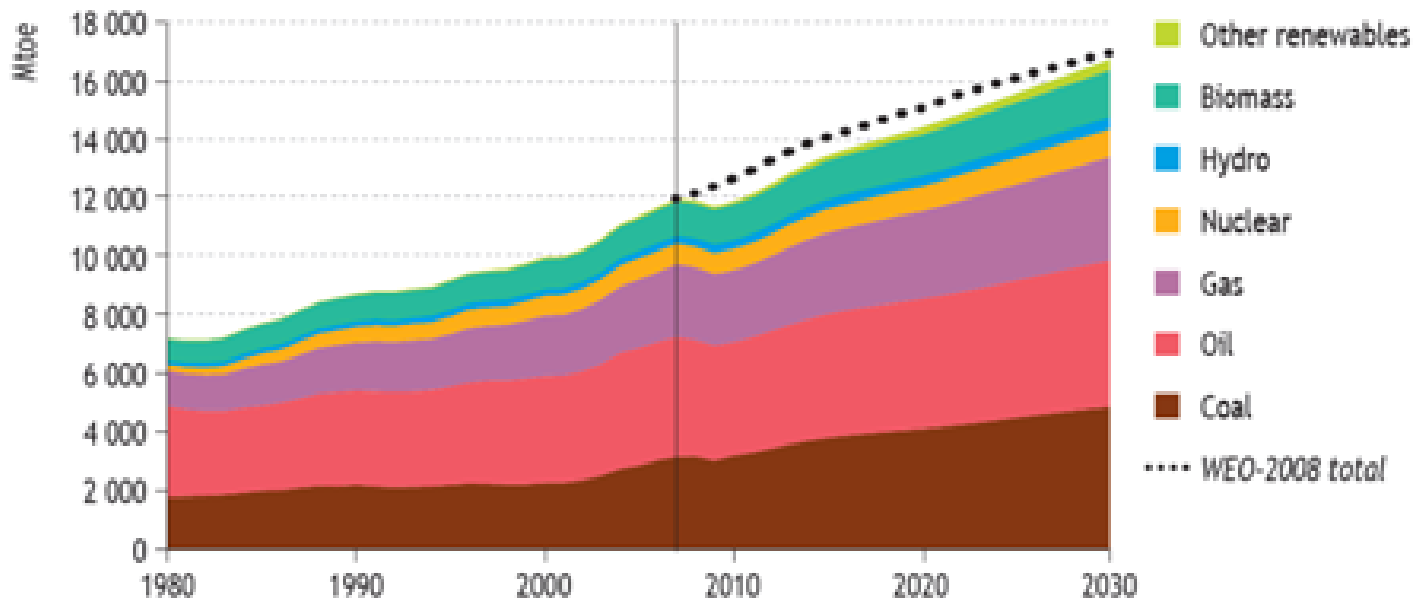
Sources: **2006:** Derived from Energy Information Administration (EIA), *International Energy Annual 2006* (June-December 2008), web site [www.eia.doe.gov/iea](http://www.eia.doe.gov/iea). **Projections:** EIA, *World Energy Projections Plus* (2009).

**Why Coal?:** Reliable supply, we know where it is, high energy density, not explosive.

# IEA World Energy Outlook 2009 (reference scenario)

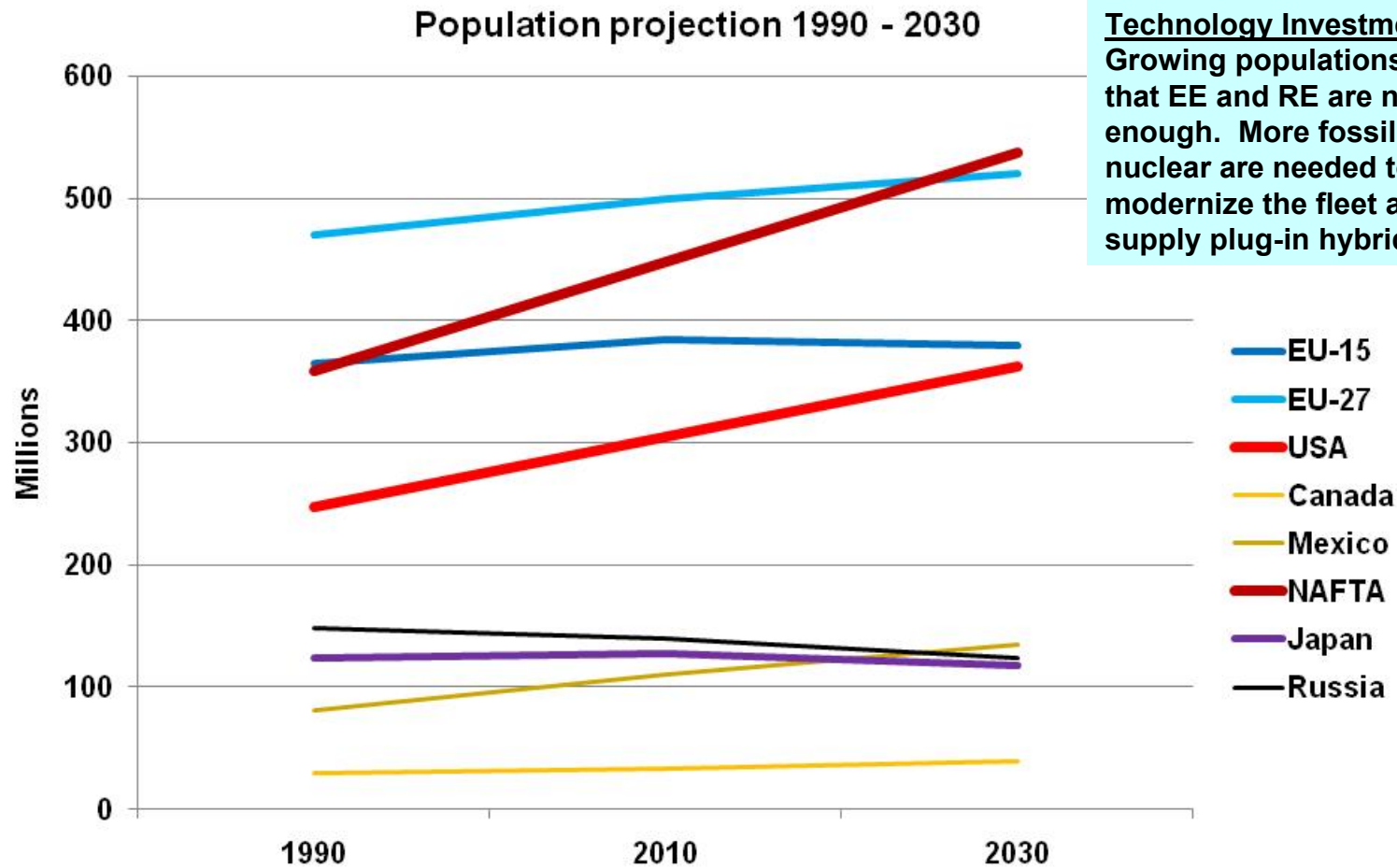
Coal remains an expanding portion of energy supply through 2030.

**Figure 1.1** • World primary energy demand by fuel in the Reference Scenario



# Population Growth a Key Factor in Policy Differences

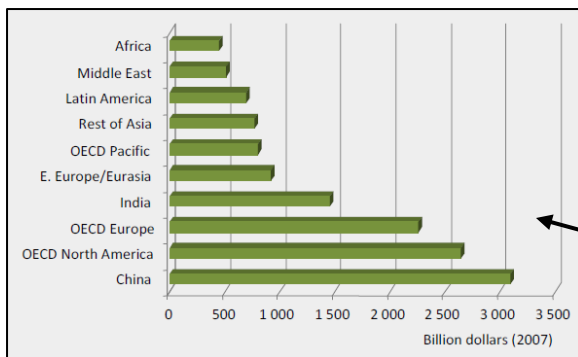
Population growth in the NAFTA region is robustly rising, while the EU-15, Japan, and Russia are dying.



Public -Private Partnerships can flow through the bond market

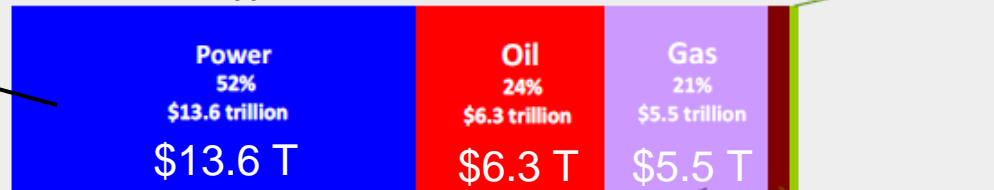
## Capital Investment Required is Daunting → Bonds

Lenders and bondholders will provide the bulk of energy financing to 2030, NOT venture capital, so a credit risk framework will prevail, focused on predictable, steady cash flows.

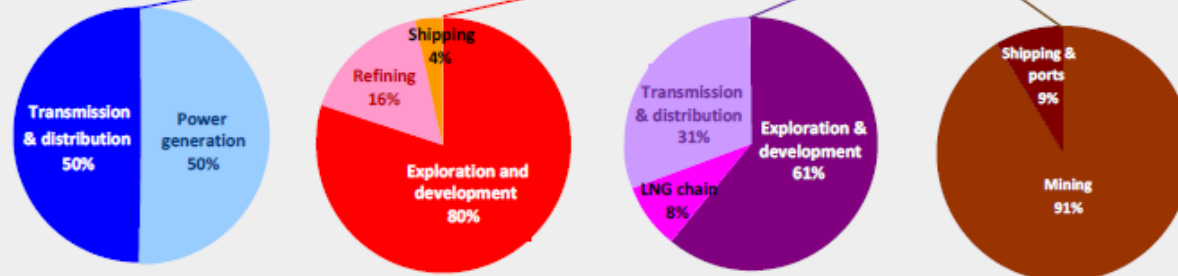


### \$26 Trillion by 2030

for 550 ppm scenario



**75% of power sector investment (\$13.6 T) targeted in China, OECD Europe, and N.America**



*Investment of \$26 trillion, or over \$1 trillion/year, is needed, but the credit squeeze could delay spending, potentially setting up a supply-crunch once the economy recovers*

© OECD/IEA - 2008

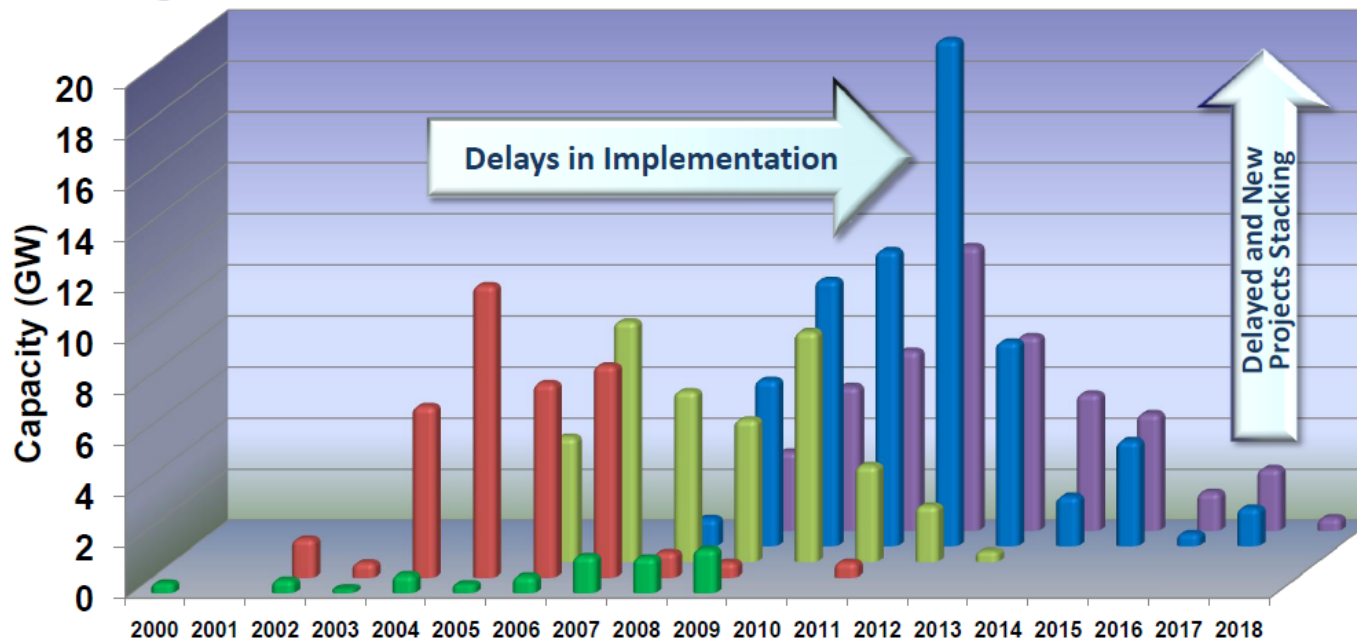
Lack of policy consensus hinders permitting, investment, modernization of the fossil fleet.

## NETL: U.S. Coal Plant Additions... none with CCS

Current coal-fired projects in development reflect the potential for a surge in growth, but questions exist as to whether this is achievable. The 3,079 MW of new added capacity installed in the last three and a half years (800 MW per year) is only 11% of the 27,218 MW of progressing plants that are proposed to be operational by 2012.

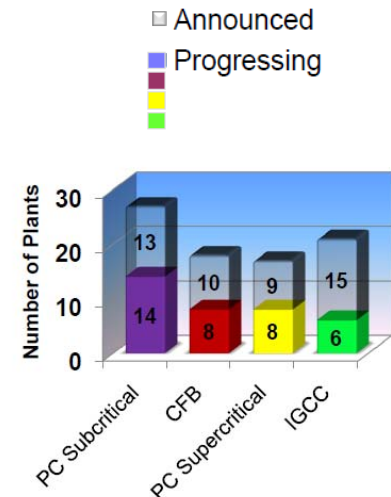
### Past Capacity Announcements vs. Actual

Figure 1



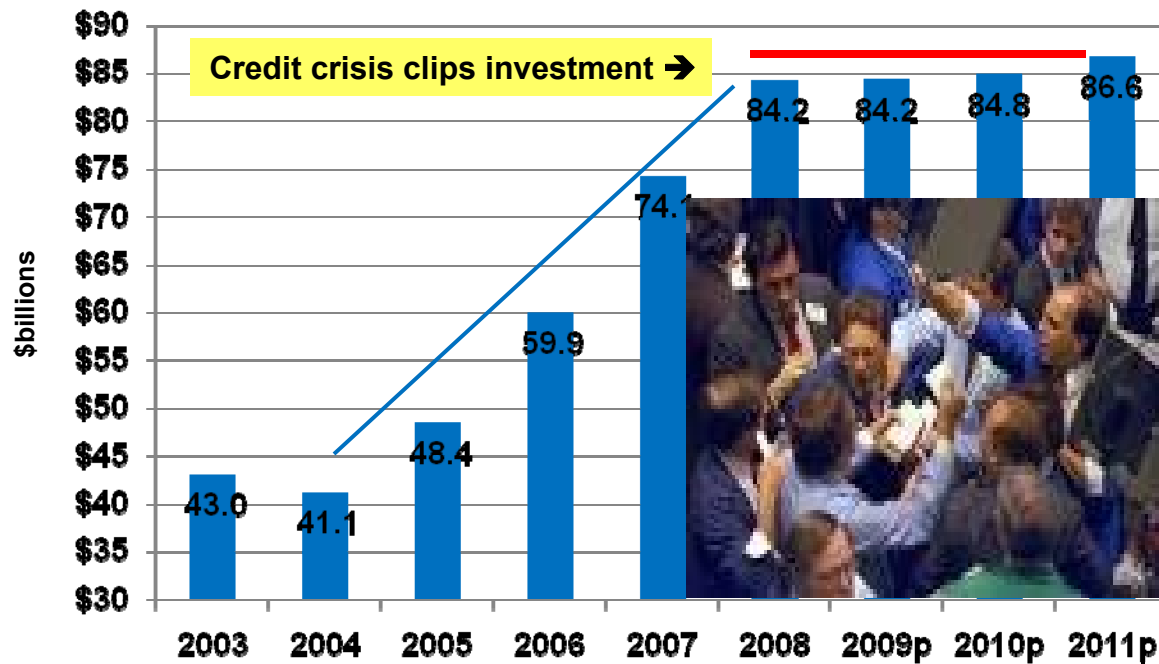
Historically, actual capacity has been shown to be significantly less than proposed capacity. For example, the 2002 report listed 11,455 MW of proposed capacity for the year 2005 when actually only 329 MW were constructed.

■ Actual   
 ■ 2002 Report   
 ■ 2005 Report   
 ■ 2007 Report   
 ■ 2009 Report



# U.S. Utility Capital Investment Clipped (updated June 2009)

## U.S. Shareholder-Owned Electric Utilities

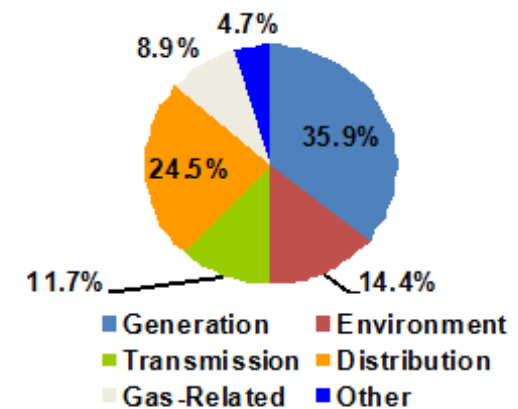


Source: EEI

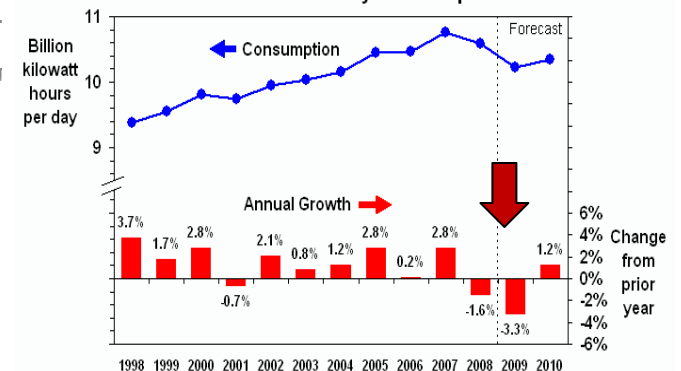
### Growth in capital spending has subsided given:

1. Credit crisis and shorter debt terms
2. Slump in overall demand growth with recession
3. Regulatory uncertainty related to GHGs, CAA, UIC
4. Elevated costs for construction

## 2008 Capital Expenditures



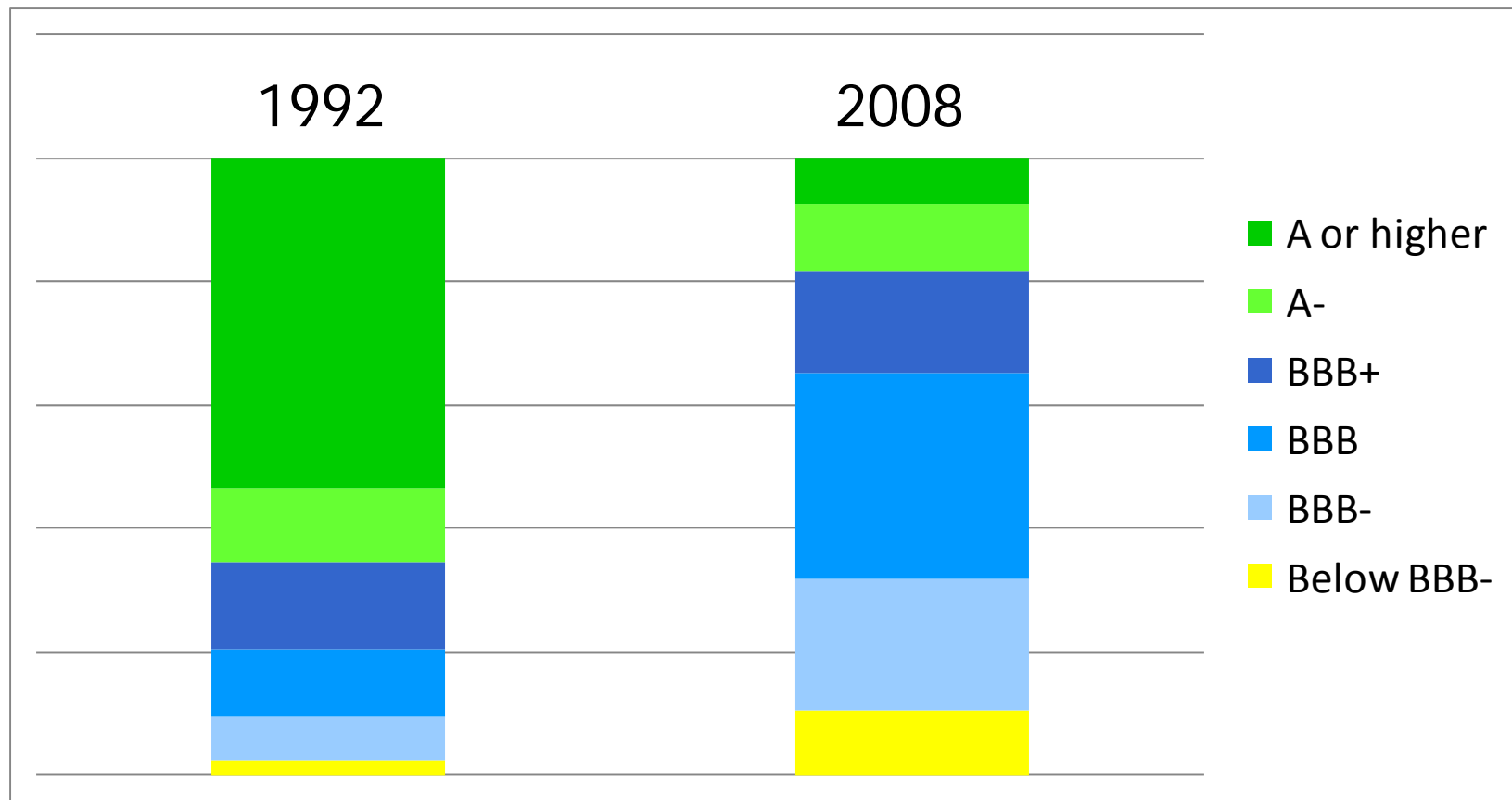
## U.S. Total Electricity Consumption



Short-Term Energy Outlook, September 2009

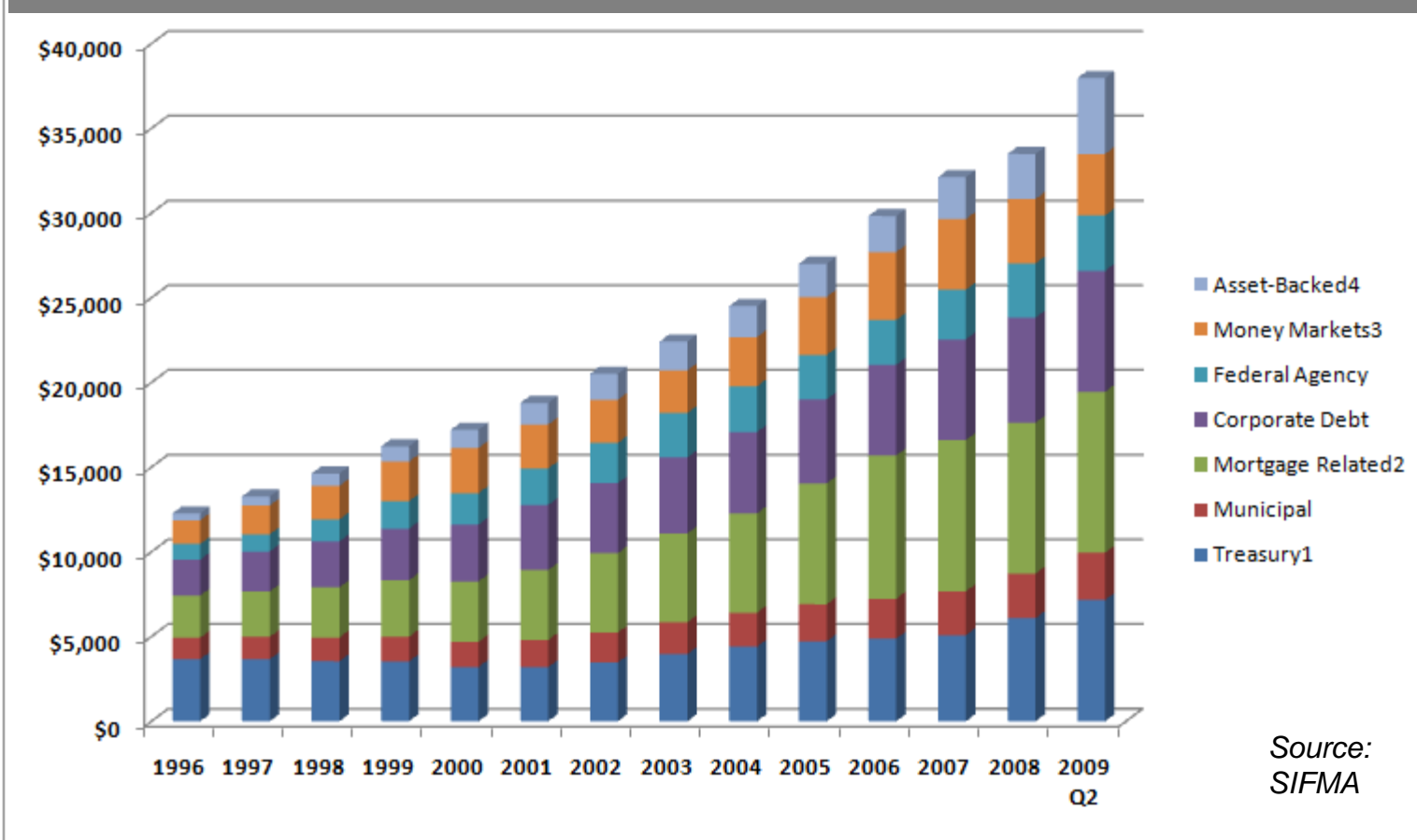
## Declining Credit Ratings of Utilities: 1992 vs. 2008

Erosion of credit standing raises capital costs for the power sector.



## U.S. Bond Market: Big Enough at \$35 Trillion+

Energy infrastructure is financed in bond market, which sees \$4-5T a year in new bond issuance, about \$60-100B for power sector.



# Price signals... but to which “Market” ?

... to Consumer (end-use) market or to Capital market ?

Annual  
Global  
Market  
Size

\$2.0T

<\$0.1T

\$1.6T

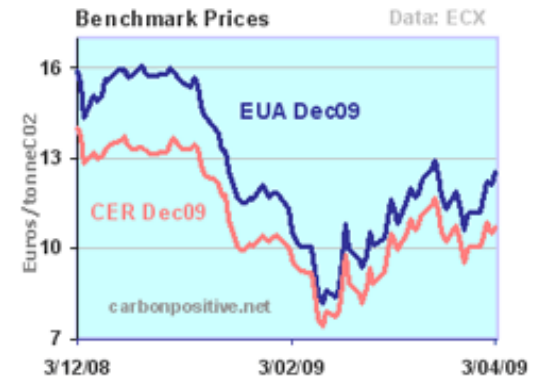
\$35T+

(U.S.)  
\$100T+  
globally

## Most volatile

- **Fuels market** (global for oil; regional for gas)
- **Carbon market (immature)**
- **Electricity “market”** (regional by nature; regulated in part)  
... and demand responds poorly to price; supply is restricted.

### Volatile carbon prices

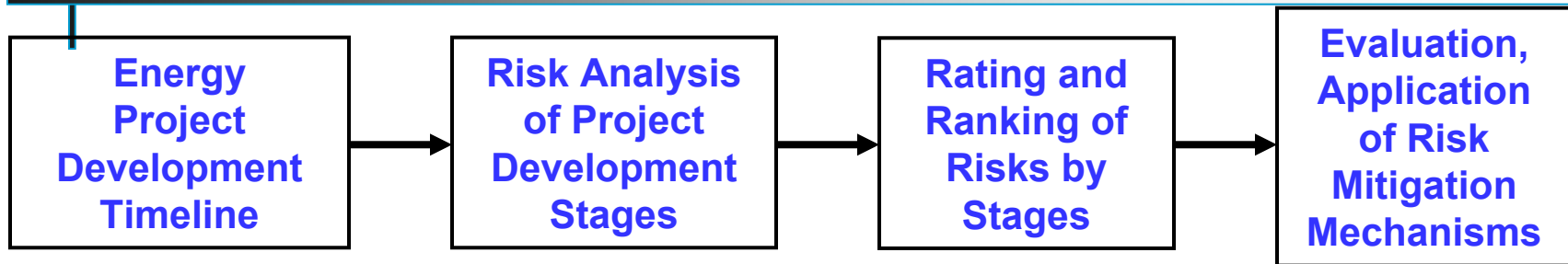


## Less volatile... and large enough to handle the load

- ➔ **Bond / Capital market** (national, global... mature)  
... and volatile electricity and carbon prices chill lending.  
**Aim price signals at capital investment vs. consumption.**  
Energy consumption responds poorly to price. Modernization is a better path.

Debt Financing Drives the Framework, not "Venture Capital"

## ***Approach to Commercial Risk Framework***



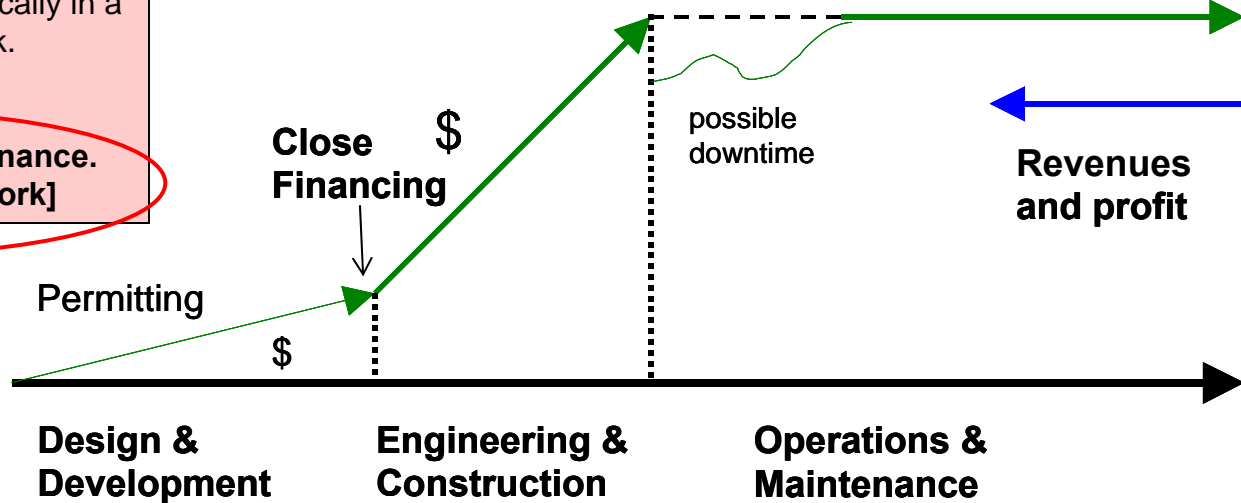
Regulatory and policy risks

Technical and operating risks

Market risks

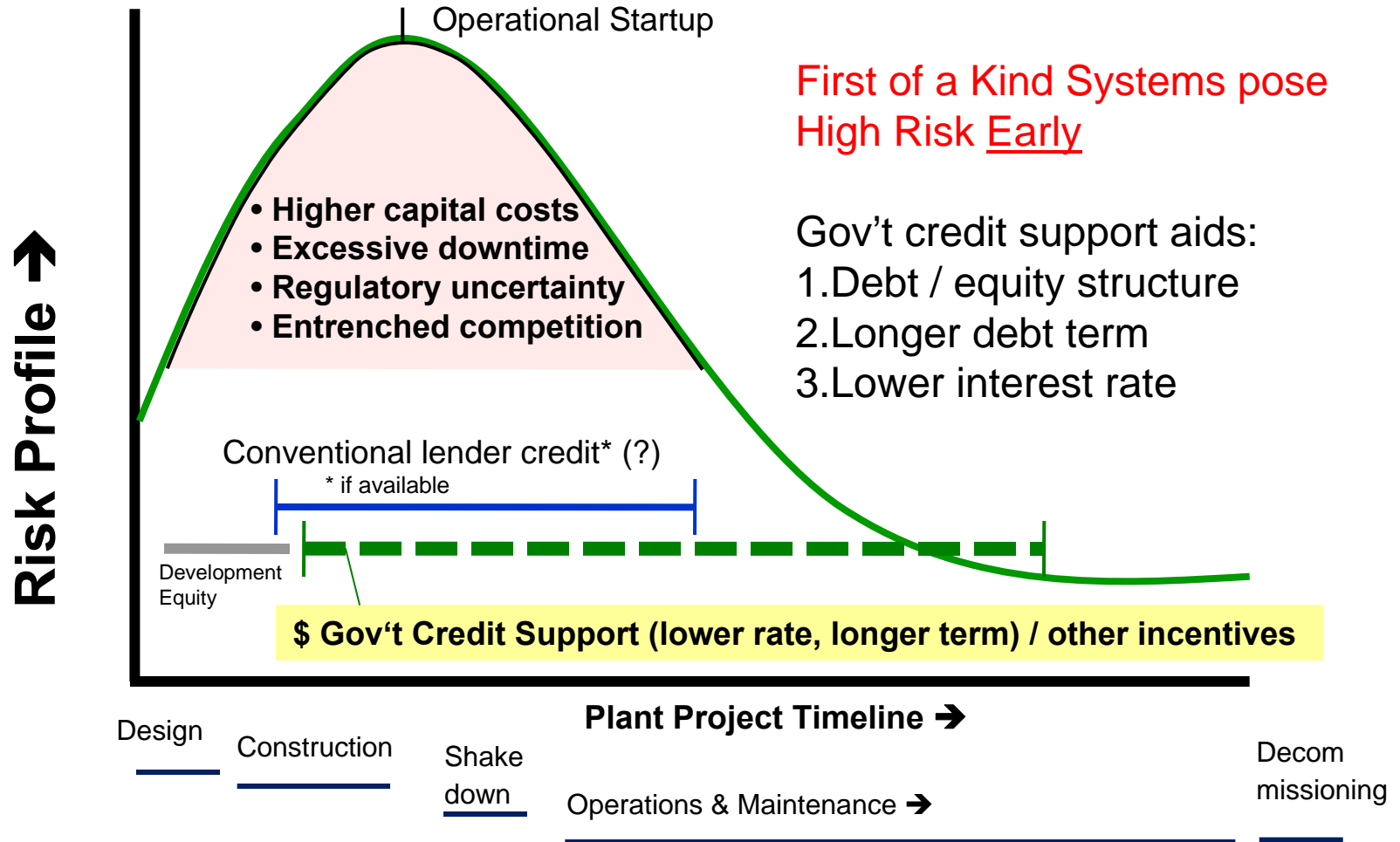
Fossil projects with CCS cannot complete financing without a comprehensive commercial risk analysis by creditors, typically in a project finance framework.

**Deployment = project finance.**  
[credit risk framework]



Source:  
Scully  
Capital

# Risk Profile on Innovative Technology Projects



Source:  
ADPaterson

## *Risk Rating Results for CCS Deployment (Spring 2008-9)*

- **Risk Ratings frame the challenge: Financing**
- **Approach & Methodology / Participants**
- **Risk ratings: Highs and Lows**
- **Summary Observations & Path Forward**

The severity of risk is gauged within **a time horizon** for the **likelihood** an event occurs times the **impact** (detriment) to the project (e.g., on assets and cash flows) for various risks:

Within a Time Horizon

**Probability x Impact = Severity of Risk**

# Risks → Mitigation Approaches → Actions Needed

## CCS Alliance Scope:

- I) Risk Study for CCS Deployment (coal power plants or energy projects with CCS)
- II) Legal research on critical issues, risks and formulation of mitigation options

### A) Commercial Risk Analysis

#### Risk Type

- 1) Tech-CCS
- 2) Reg-CCS
- 3) ...
- 4) ...

#### Key Risks

- Capital cost with CCS too high  
State rules on CCS not clear

Analysis based on Interviews of key actors:  
(results of Risk Study)

Category	(Of) Specific Risk	25 point scale Rated Severity	Relative Value
ALL (34 Os)	Overall Average	10.2	Average
Tech - CCS	7. Capital costs for carbon capture equipment (>50% capture) impair financing of a new plant.	17.1	High
Policy - CCS	18. National policies lack sufficient incentives (loans, tax measures) for first-of-a-kind plants.	16.2	High
Policy - CCS	13. Uncertainty about EPA carbon emission regulations and CCS hampers permitting on new plant.	15.9	High
Policy - CCS	19. National policies (e.g., tax credits) lack sufficient incentives for sequestration of carbon.	15.6	High
Policy - CCS	17. Regional, state policies fail to provide sufficient clarity about CCS requirements and liability.	15.2	High
Policy - CCS	15. Value of (eventual) carbon emission allowances does not adequately cover costs of CCS.	13.9	Above Avg.
Market-CCS	31. EPA regulations on underground injection of CO2 and liability fail to offer clarity for financing.	13.4	Above Avg.
Market-CCS	34. Prospect of liability for long-term leakage of CO2 from CCS threatens new plant financing.	13.3	Above Avg.
Market	28. Financing of new plant proves difficult (e.g., debt tenors too short, more equity required).	13.3	Above Avg.
Market-CCS	33. Revenues from the sale of CO2 (e.g., for EOR) are not adequate to cover costs of CCS.	12.9	Above Avg.
Policy - CCS	16. Regional, state policies fail to provide sufficient incentives to support plant economics with CCS.	12.9	Above Avg.
Market-CCS	27. Market rates or state PUC approved rates do not offer sufficient recovery of CCS costs.	12.8	Above Avg.
Market	23. Current conventional coal plants are allowed to run longer, curbing demand for new plants.	9.7	Average
Tech - CCS	9. The site for CCS could suffer a significant technical failure and more than minor leakage occurs.	7.3	Below Avg.
Tech - CCS	11. Transportation of CO2 for CCS proves difficult logistically (e.g., transit path too long).	7.0	Below Avg.
Market-CCS	32. Transport costs of CO2 become more costly after new plant is operating, threatening run time.	6.1	Low
Market	24. Natural gas prices drift and stay lower (<\$4/MBtu), making the plant with CCS uncompetitive.	5.3	Low

### B) Mitigation Mechanisms

#### Government

- Loan guarantees
- Grants (by DOE, etc.)
- Tax subsidies
- Injection regulations
- Permitting approaches
- Carbon emission rules
- Federal "Energy Bank"
- LT purchase contracts

#### Industry / Investors

- Insurance / bonding
- Engineering backups
- Long-term contracts
- Site review, feasibility
- Collateral, backup supply

### C) Government Actions needed for Mitigation

(Match actions with mechanisms)

#### Near-term / Long-term

- Appropriations
- Legislation
- Tax bill
- Regulation
- Agency action
- Executive order
- Reserves (e.g., SPRO)
- Others

## ***Rating Respondents: Sophisticated on CCS Issues***

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**Gasification Technologies Council**

**Conoco Phillips**

**GE**

**Siemens**

**Air Liquide**

**Chevron**

**Excelsior Energy**

**Warley Parsons**

**CH2M Hill**

**Burns & McDonnell**

**Potomac-Hudson Engineering**

**Oglethorpe Energy**

**Eastman Chemical**

**e3Gasification**

**ZeroGen (Australia)**

**Arkansas Electric Coop Corp.**

**National Rural Electric Coop Assoc.**

**Minnkota Power Coop**

**Pace Energy Consultants**

**IEA GHG R&D Programme (London)**

**Hensley Energy**

**EPRI**

**World Coal Institute (WCI)**

**ICO2N (Canada)**

**Natural Resources Defense Council**

**World Resources Institute**

**Imperial College of London**

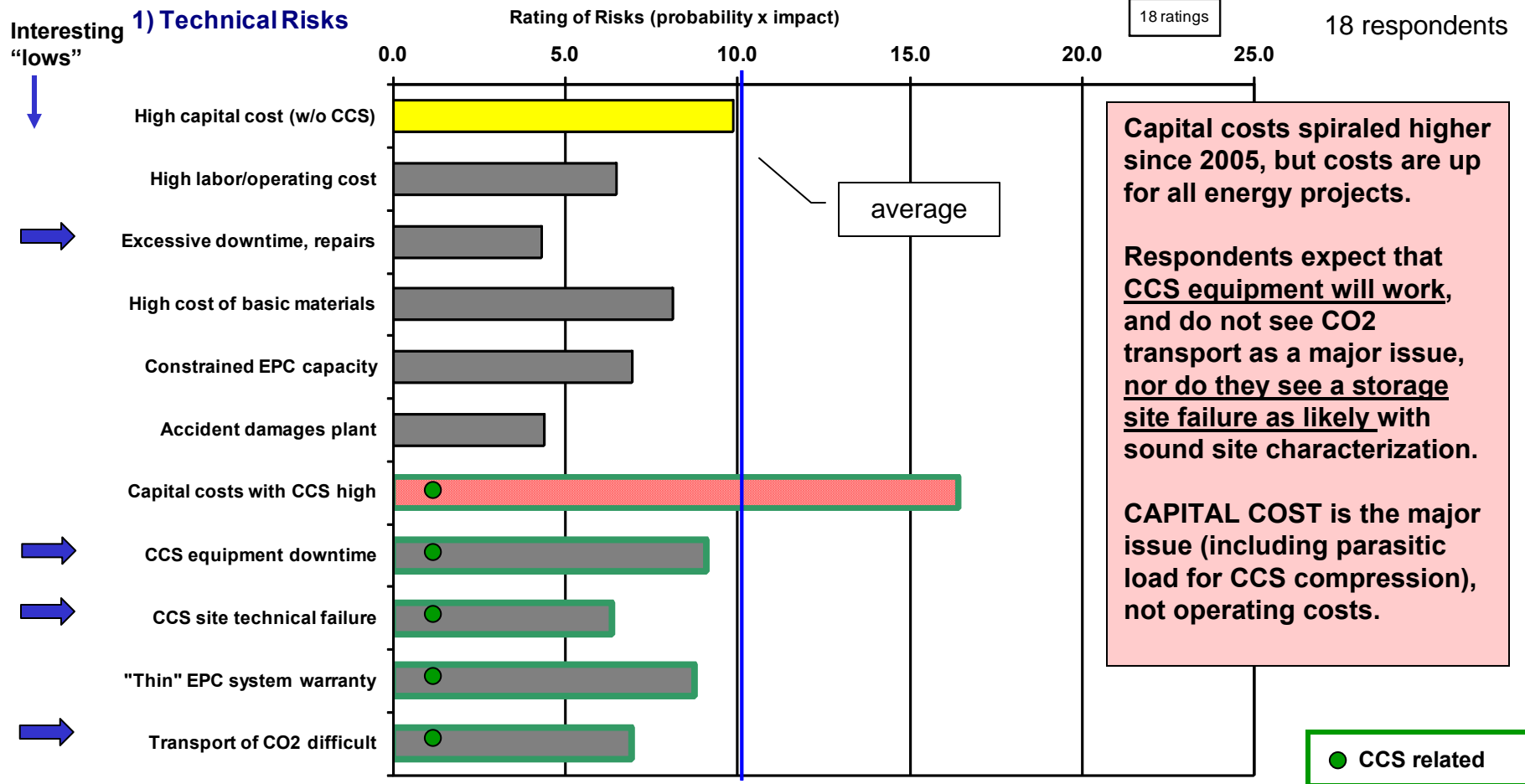
**MIT**

**U.S. Dept. of Energy (Fossil Energy)**

**New Energy Finance**

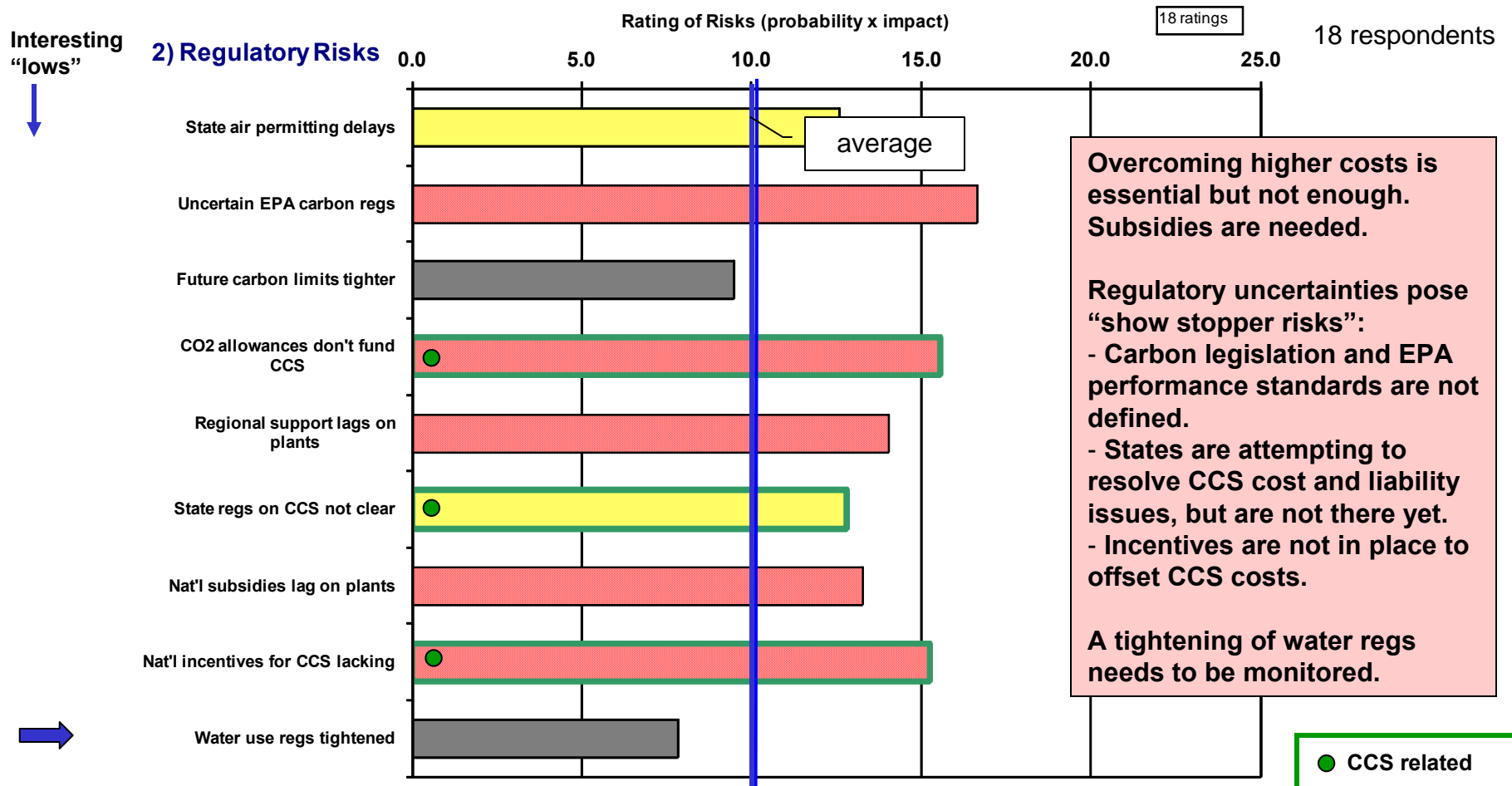
# Risk Ratings: TECHNICAL

Deploying CCS creates a large drain on plant production, so capital costs run much higher.



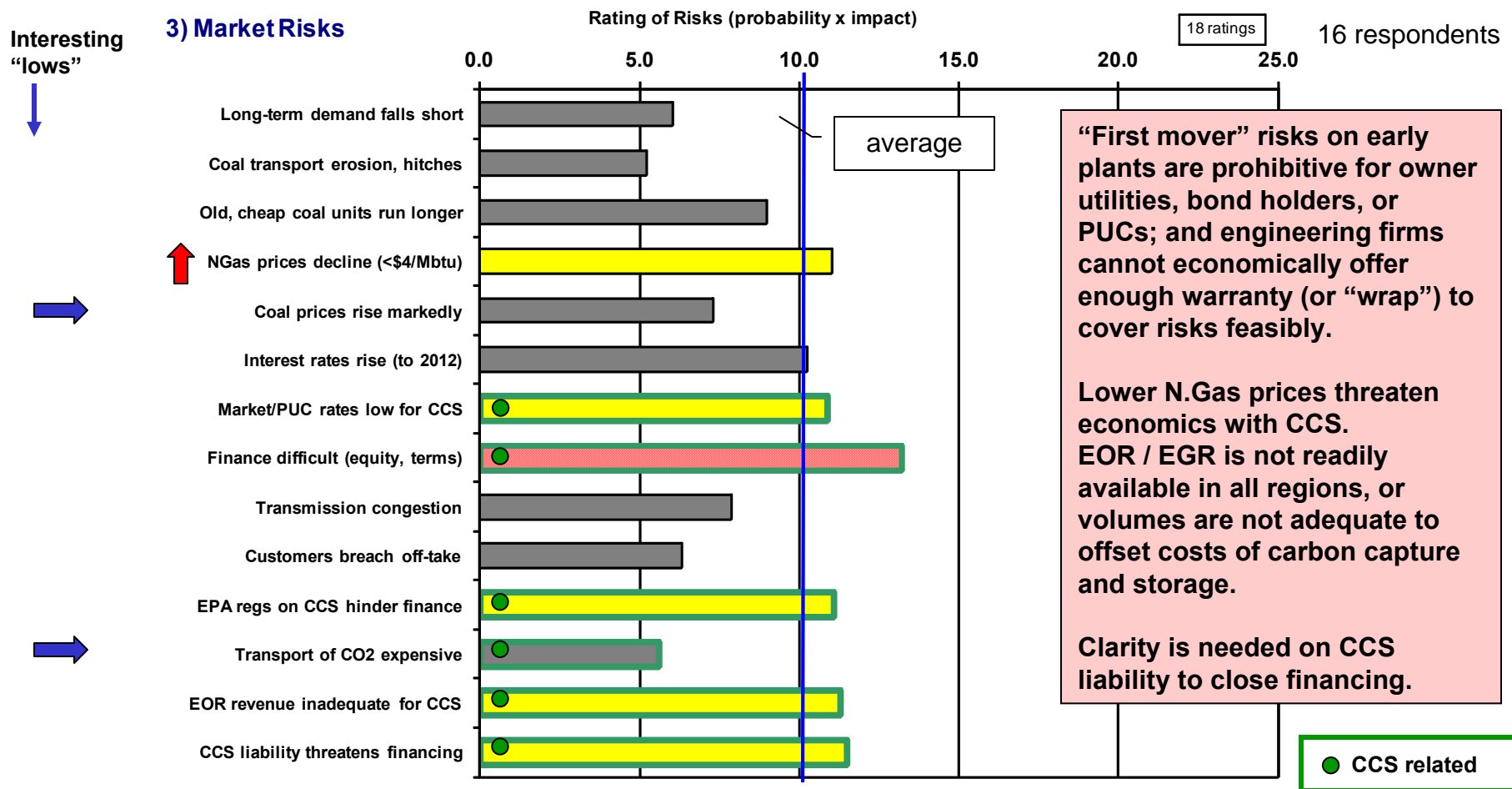
# Risk Ratings: REGULATORY / POLICY

Regulatory uncertainties (federal + state) about CCS costs and liability threaten financing.



# Risk Ratings: MARKET

Lack of subsidies and uncertainty about liability for CCS make financing very difficult.



## ***Risk Ratings on CCS – Update 2009***

- **Concerns about capital costs remain high, primarily because of parasitic load.**
- **Low NGas prices (<\$6/MBtu) since late 2008 pose larger competitive problems.**
- **Subsidies are needed to overcome higher costs, but that is not enough.**  
(The “Boucher bill” proposes to pay for subsidies with feedstock levies on coal, fossil fuels)
- **Regulatory uncertainties pose “show stopper” risks for deployment of CCS:**
  - U.S. EPA regulatory rules (UIC) on CCS are not defined, but are in process.
  - The outlook for GHG/carbon emission legislation is more uncertain *despite* passage of the House bill... in other words; more questions about implementation were raised !
  - But, without a cap of some form, utility commissioners face little prudence to consider CCS.
  - State regulations are not clear enough yet to fully resolve CCS cost and liability issues.
  - Incentives (tax credits, loans, allowances) are not enough to offset higher CCS costs.
  - A tightening of water regulations does not appear to pose much of a risk currently.
- **“First mover” risks are prohibitive for owner utilities, bondholders, or PUCs; and engineering firms cannot economically offer enough warranty (or “wrap”) to cover risks. Few owners want to finance early CCS demos and plants.**
- **Respondents expect that CCS equipment will work, and do not see CO<sub>2</sub> transport as a showstopper issue, nor do they see a CCS site failure as likely.**
- **Clarity is needed on CCS liability to close financing – perhaps a “showstopper”.**
- **Increases in coal prices or transport costs were not rated high risks.**

## *Mechanisms for Mitigation of Critical Risks*

**Risk-based mechanisms entail less federal budget impact, covering more projects.**

**Mechanisms provide A) a subsidy or B) risk assumption:**

**A. Traditional “Cost-based” Mechanisms: Subsidies for higher cost technologies early**

In Place

- ✓ 1. Federal Grants (e.g., DOE CCPI program, EU initiatives)
- ✓ 2. Investment tax credits / Accelerated depreciation (Sec. 48 ITCs)
- ✓ 3. Unit tax credits (e.g., production tax credits, or CCS tax credits)
- ? 4. Rate subsidies (carbon savings allowances or feed-in tariffs)

**B. Progressive “Risk-based” Mechanisms: Negotiated between public – private sector actors**

- ✓ 1. Loans or guarantees (Title 17 under Energy Policy Act 2005)
- ? 2. Federal off-take contract / Capacity payments for CCS volume
- ✓ 3. State rate regulation (available in about half the states)
- ✓ 4. Dispatch preference (state approved in some states)
- X 5. CCS Liability Regime at Federal level (draft exists in EU, not USA yet)

## *Summary Points for Commercial Deployment*

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- CCS is not economic and subsidies will be needed for first plants.
- Some tools are in place, but legislation is needed to resolve uncertainties. Financing is key: **No financing = no CCS deployment.**
- Utility bond holders require certainty on CCS liability without indefinite, long-term exposure after injection. Private owners and insurance could manage first losses, states may want to share risks to encourage plants.
- With dependence on reliable coal-based electricity for 12 hrs a day, more in some regions, CCS is vital for progress on carbon emissions.
- The age of the coal fleet provides an opportunity to modernize, retiring high emission plants, and building much more efficient ones.
- Grants and tax credits are easy for industry to ask for, but are difficult for Congress to fully fund. Levies on coal or carbon may be used; but those funds would need to be sequestered for fossil projects.
- Risk-based policies (such as loan guarantees, or dispatch preference) can help stretch limited government funds across enough early projects.
- If risks are fully addressed through a mix of policies and demos, early plants could be built with CCS to demonstrate feasibility.

## ***Path Forward: Risk Mitigation & Financing***

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### Financing

**Offset costs**

- **Work with lenders and the bond market on incentives**
- **Establish extent of private insurance capacity on CCS risks**
- **Utilize loan guarantees, grants and tax credits to offset CCS costs**
- **Develop financial mechanisms and offsets for risk transfer**

### Regulations and State Actions

**Clarify rules**

- **Engage on EPA UIC regulations to resolve CCS liability issues**
- **Monitor state actions on CCS characterization and GHG rules**
- **Work with state PUCs willing to support plants with CCS in rates**

### Federal Legislation

**Address LT liability, key risks**

- **Garner financing for CCS demonstrations (e.g., levies on fossil use)**
- **Utilize results of CCS demonstrations to refine risk assessments (capture, transport, geologies, injection, closure, monitoring)**
- **Track legislation on carbon emissions, allowances and incentives for reductions, including ultimate liability for CCS**

## ***Critical Legislative and Regulatory Efforts Underway***

- **EPA UIC\* Draft Rule for CO2 Injection (released for comment in July)**
- **EPA response to Mass. v. EPA: CO2 regulation under Clean Air Act**
- **Review of rulings after suspension of CAIR and Mercury Rule**
- **New Source Review regulations under consideration (U.S. EPA)**
- **Carbon emission legislation in 2009-2010 (various proposals)**
- **State carbon emission legislation now (CA, WA, New England...)**
- **Ongoing EOR / EGR permitting (concentrated in Gulf Coast)**
- **Permits for CCS demonstration projects (regional partnerships)**
- **International deliberations on GHG limits could bear on U.S.**
- **Credit agency reviews of GHG impact of energy investments (S&P, Fitch, Moody's, major banks) – looking at long-term risks.**

\*EPA Underground Injection Control program

***FINISH: Discussion / Q&A***

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## *Not all the policy elements are connected...*

### **Carbon cap legislation**

- Enforcement timeline
- Sector coverage
- Allowance allocation
- Safety valves and offsets

**Adequate level  
and types of  
financial  
Incentives...**



**New source  
performance  
regulations ?**

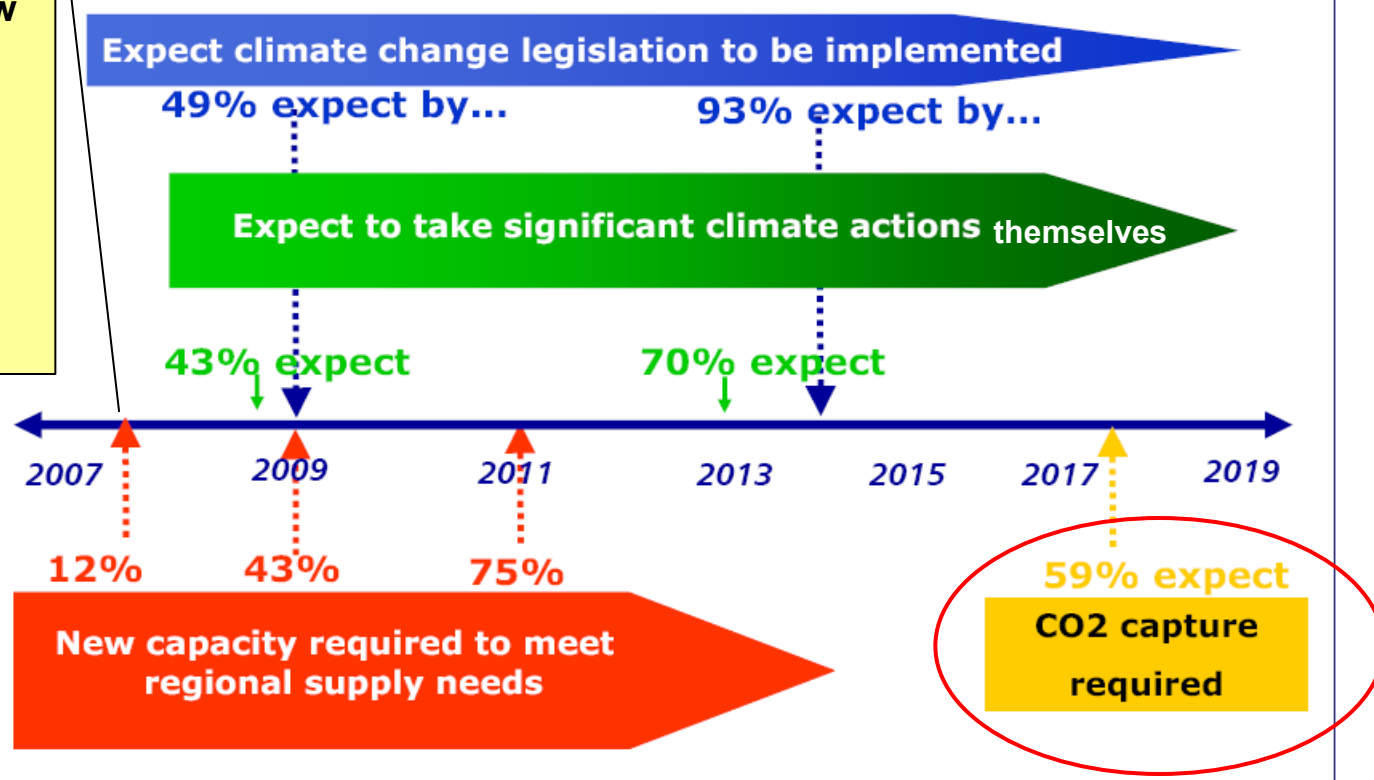
**CCS  
liability  
coverage**

## Outlook on U.S. Carbon Policy Timing: Survey of Utility Execs (2007)



### Will new capacity have to be built before climate actions are in place?

**Challenge:** New capacity is needed before federal legislation is expected to be resolved and litigated.



Source: Survey by GF Energy of Utility Executives in North America, April 2007

# Risks vs. Mechanisms for Mitigation (X = helps cover risk)

Existing Mechanisms do NOT adequately mitigate critical risks. Subsidies are not enough.

Increasing Risk Coverage

Lead Actor	Mechanisms (vs. Critical Risks)	High Capital Costs with CCS	Uncertainty on Carbon Emission Cap & Regs	Unclear rules on CCS Injection	Lack of clarity on long-term CCS Liability	Electric prices (or rates set) too low for CCS costs
	Level of Risk ==>	High	High	High	High / Med	High / Med
	<b>Existing Mechanisms (U.S.)</b>					
	<i>A) Subsidies</i>					
Federal	Federal grants (DOE)	XXX				XX
Federal	Investment tax credits (capital subsidy)	XX				X
Federal	Unit tax credits (operating subsidy)	XX				X
State	State grants (e.g., for engineering)	XX		X		X
	<i>B) Risk Assumption / Transfer</i>					
Federal	Federal Loan Guarantee	XXX	XX		X	XX
State	Rate-basing or Dispatch Preference	XXX	XXX	XX		XX
Industry	Stockpiles; Backup supplies or systems	XX				
	<b>Level of Risk Covered</b>	Covered	Exposed	Exposed	Showstopper!	Adequate
	<b>Action Needed (e.g., legislation)</b>					
	<i>A) Subsidies</i>					
State	Additional collateral or Revolving funds	X				XX
Federal	Carbon allowances (traded with cap)	XX	XXX	XX		XXX
	<i>B) Risk Assumption / Transfer</i>					
Federal	Clear regulations on carbon emissions		XXX			
State	Clear rules on CCS and LT Liability			XXX	XXX	X
Industry	Insurance and Carbon Offsets			X	X	
Federal	Federal off-take contract or feed-in	XXX	XXX	X		XX
Industry	EPC Turnkey "wrap" or warranties		X			
	<b>Level of Risk Covered</b>	Covered	Adequate	Adequate	Negotiable	Adequate

XXX = most coverage; XX = moderate coverage; X = a little coverage

## ***Discussion / Q&A: Bridging the Commercial Gap***

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### **Draft Recommendations from CSLF Finance Workshop to G8 / G20:**

- 1. Government and Industry Joining in Project Partnerships**
- 2. Project Facilitation Agreements for Investment Confidence**
- 3. Providing Adequate Public Funding to meet Emissions Targets**
- 4. Effective Use of Public Funding to drive the Best Projects**
- 5. Address International Alignment of Portfolio Priorities**
- 6. Accelerate the Progression of Storage Regulation, Exploration and Infrastructure**
- 7. Build Community Awareness and Support for CCS**

## ***Closing Quotes: Consensus to Move on CCS***

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**"The vast majority of new power stations in China and India will be coal-fired; not *may* be coal-fired – will be. So, developing carbon capture and storage technology is not optional, it is literally of the essence."**

**Former UK Labour Prime Minister Tony Blair**, Speaking in Tokyo ahead of the 2008 G8 Summit (June 2008) for *Breaking the Climate Deadlock: A Global Deal for a Low Carbon Future* (Sir Nicolas Stern)

**"Carbon capture and storage (CCS) for coal-fired power plants is a critical technology if we are to achieve our environmental goals while continuing to use our abundant domestic coal resources. However, CCS storage capacity is not available everywhere, and the technology itself is not fully developed and ready for deployment. We believe CCS ultimately will prove to be one of the least-cost ways to reduce CO<sub>2</sub>, and we are actively involved in projects to advance the research."**

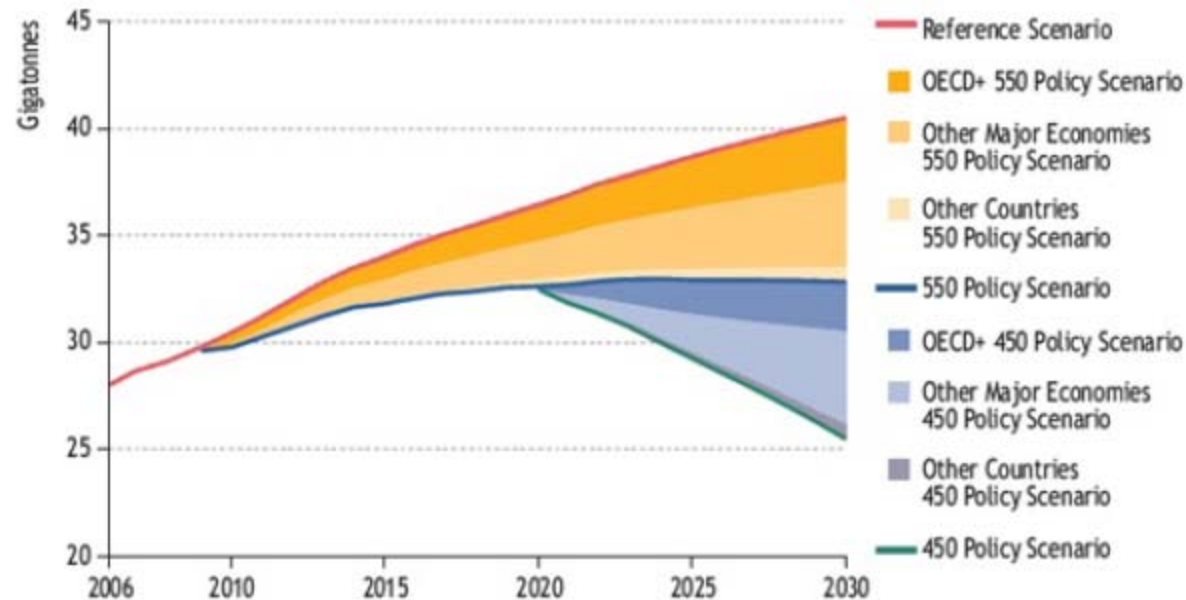
**Jim Rogers, President – Duke Energy**, June 28, 2007 from Testimony to Senate Environment & Public Works  
[http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore\\_id=96b0a903-32fc-47f8-9a36-b4ddd9805e2b](http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=96b0a903-32fc-47f8-9a36-b4ddd9805e2b)

**"We believe CCS can stimulate faster policy action and help fill the gap between what we need to do and what we have committed to do. ...Using CO<sub>2</sub> from coal plants for domestic EOR has three advantages: 1) it reduces oil imports and our trade deficit; 2) using old oil wells reduces the environmental burden of drilling new wells; and 3) oil or gas wells are a better place to put CO<sub>2</sub> than into the atmosphere."**

**David Hawkins, NRDC** at Gasification Technologies Conference, Oct. 2007

## CO<sub>2</sub> Emissions: 550ppm vs. 450ppm

**Figure 18.3** • Energy-related CO<sub>2</sub> emissions reduction by region in the 550 and 450 Policy Scenarios relative to the Reference Scenario



*Figure 2 - Emissions in the reference, 550 Policy and 450 Policy scenario with their subsequent emissions reduction wedges.*

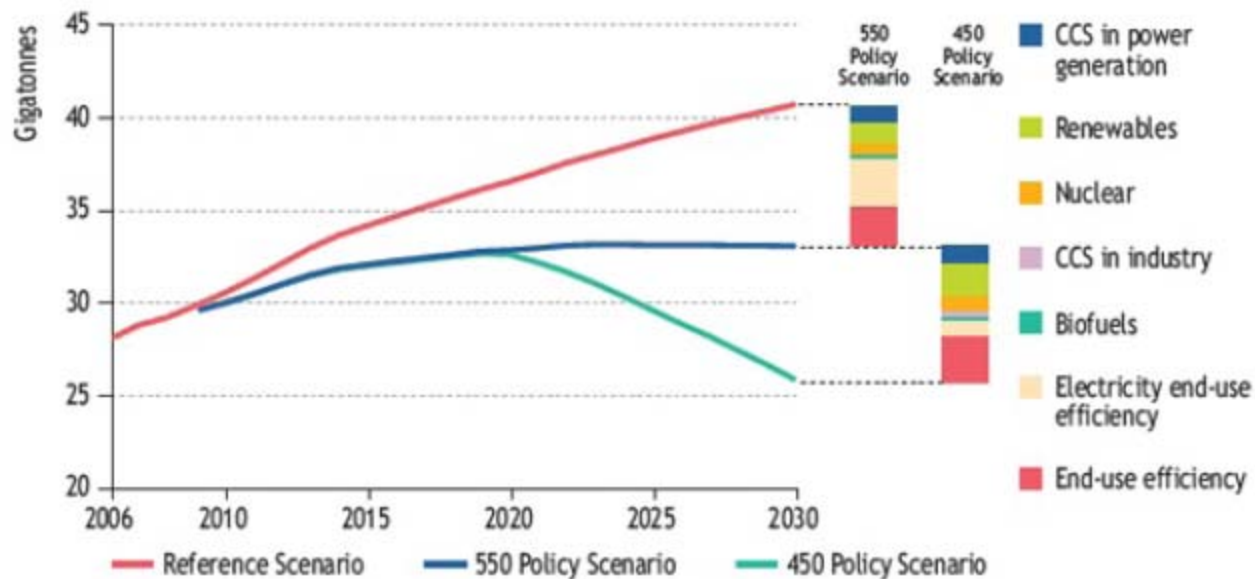
Reference scenario: coal use grows 2% on average to 2030 (or 60% from 2006 to 2030).

In the 550 policy scenario: coal use grows by 0.7% on average, with some decline after 2020 due to policy shifts.

In the 450 scenario: coal use peaks in 2020 and use is reduced even in China and India by 2030.

## Impact on Fuel Sources: 550ppm vs. 450ppm

**Figure 18.4** • Energy-related CO<sub>2</sub> emissions by source in the 550 and 450 Policy Scenarios relative to the Reference Scenario



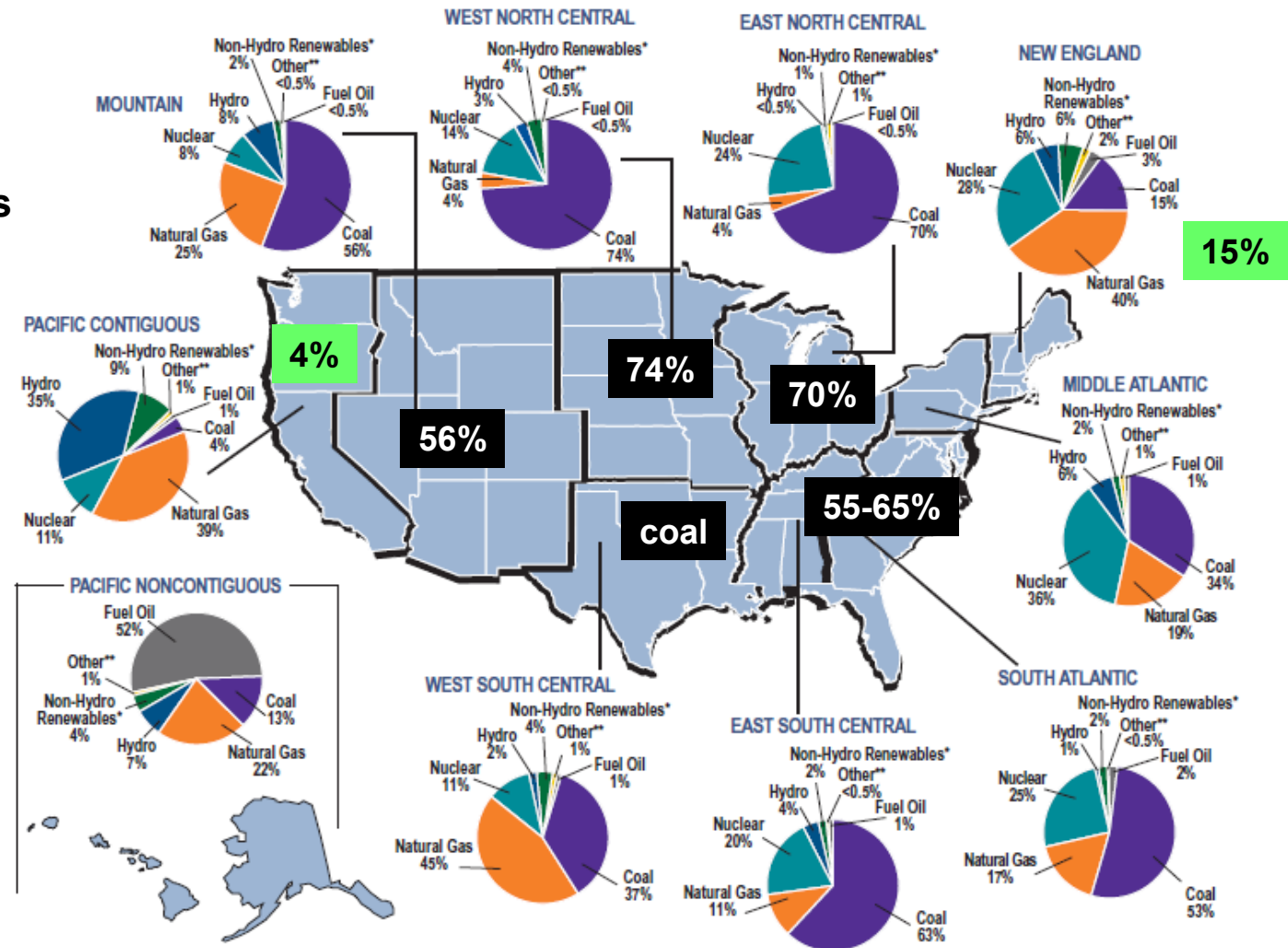
*Figure 3 - Breakdown of alternatives that need to be implemented according to the IEA to reach 450 and 550 ppm.*

CCS is needed in the event the other sources fall short (nuclear, end-use efficiency, and renewables)

# Differing Electricity Mix by U.S. Region (EEI), 2008

National averages mask very sharp regional differences on GHGs and electricity fuel sources.

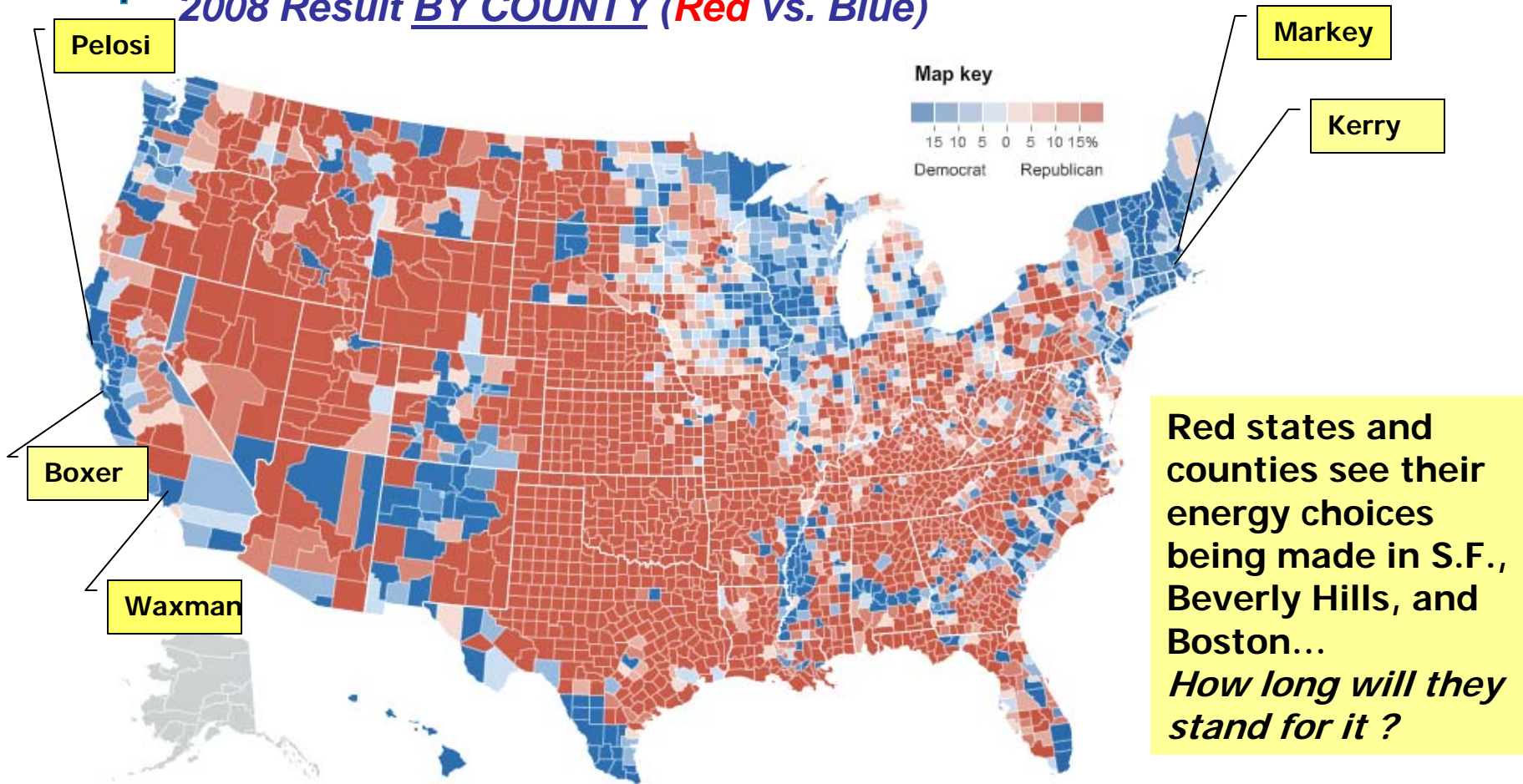
Coal provides half of U.S. electricity, but much more in certain regions.



<http://www.eei.org/>

# New Coal Plants being built in **RED** Counties...

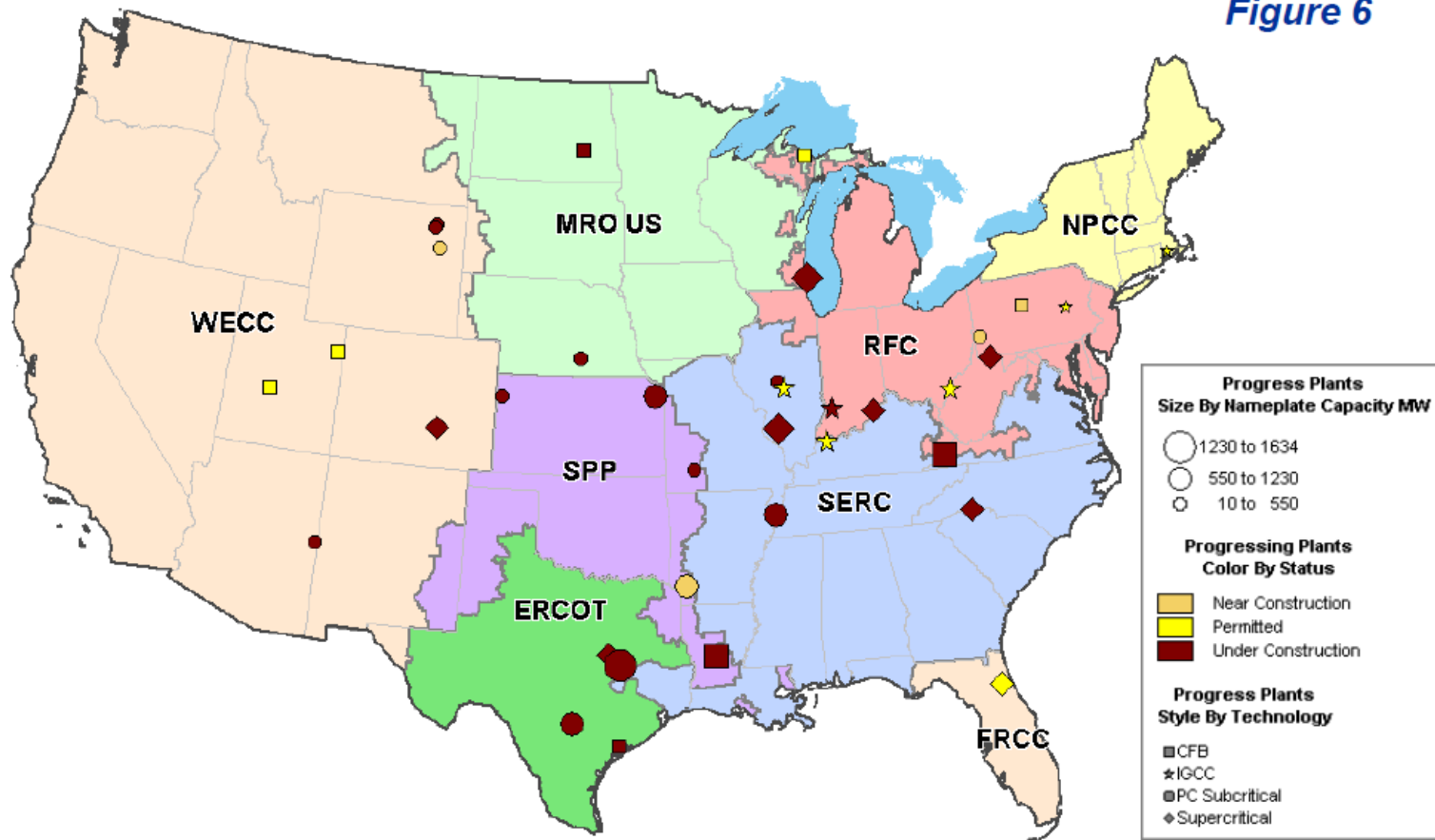
2008 Result BY COUNTY (*Red vs. Blue*)



## New Coal Plants in Plains and Ohio River Valley

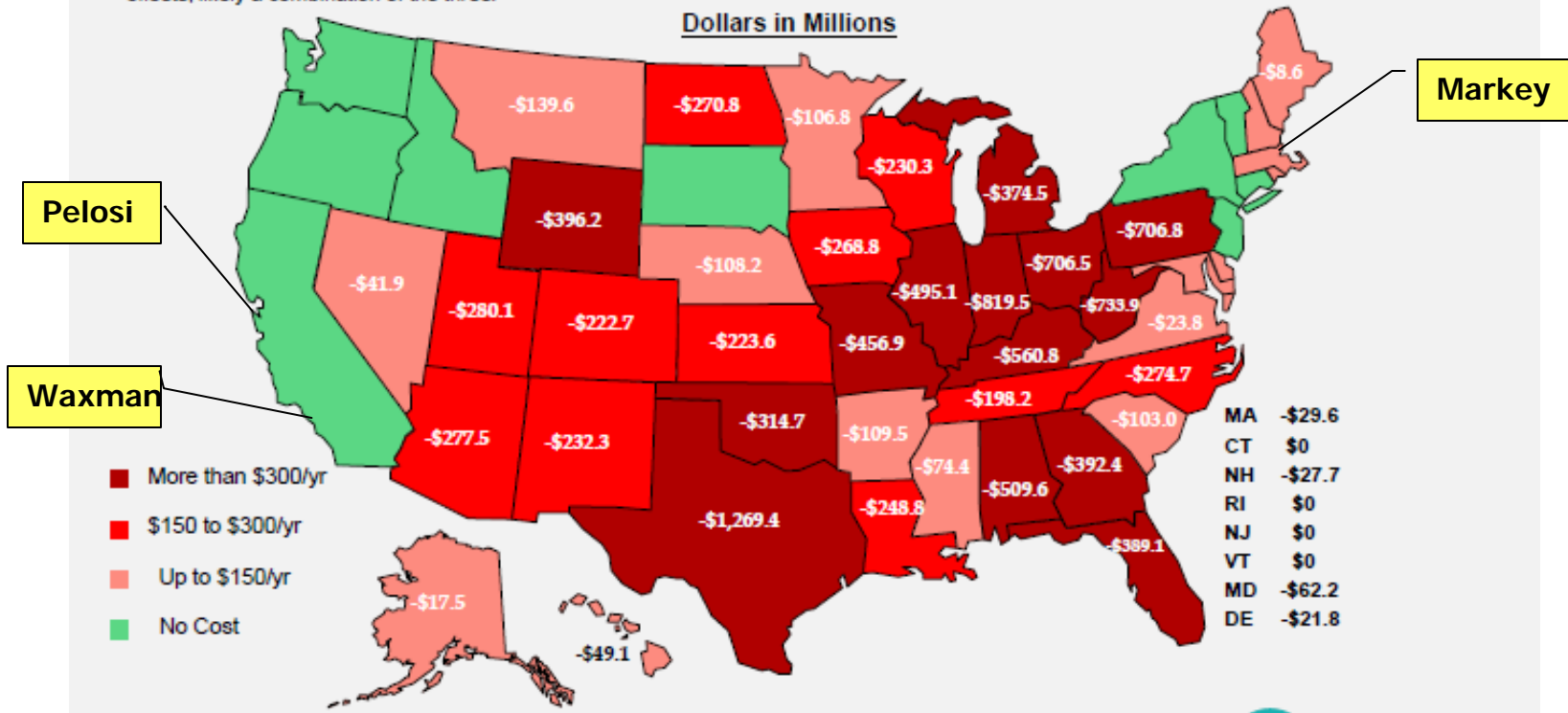
New plants are in states already dependent on coal and with low, regulated power rates. No new plants are underway in New England, California, or the hydro-intensive Northwest.

Figure 6



# Costs to States under HR 2454 (with allowances)

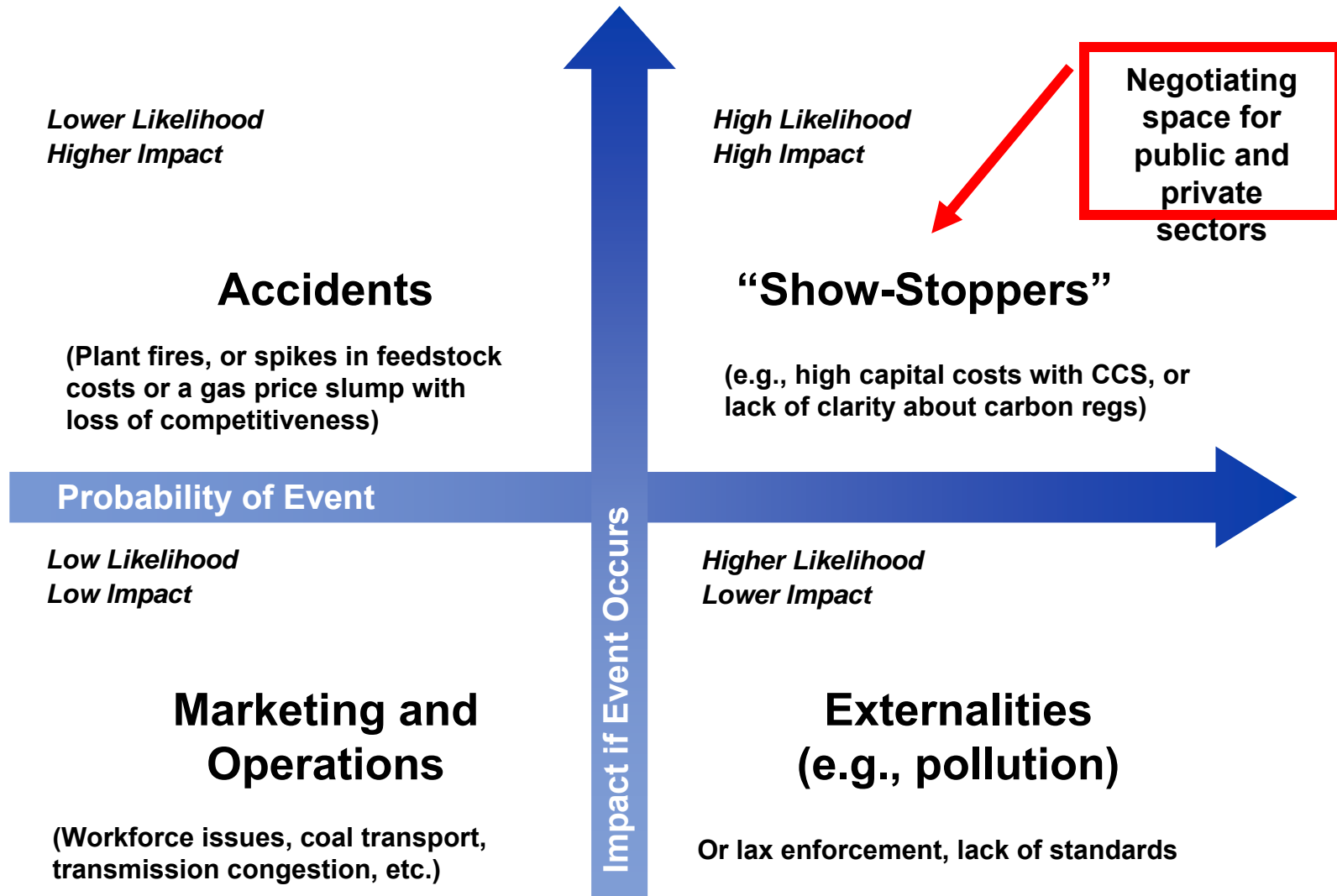
Based on the allowance allocation formula in H.R. 2454 for electricity consumers, most states will not have enough allowances to cover their emissions from electricity generation. This shortfall in allowances will lead to higher electricity costs for consumers, the total of which will roughly correlate with the dollar losses noted on the map. Midwestern and Southern states will be the hardest hit. To make up the shortfall, states will have to seek high-cost, non-CO2 emitting electricity sources, reduce electricity production and consumption, purchase allowances, or purchase domestic and international offsets, likely a combination of the three.



Based on Energy Information Administration (EIA) and Congressional Budget Office (CBO) data. Dollars in millions. Approximate cost to customers in 2012 (at CBO estimate of \$16/ton).

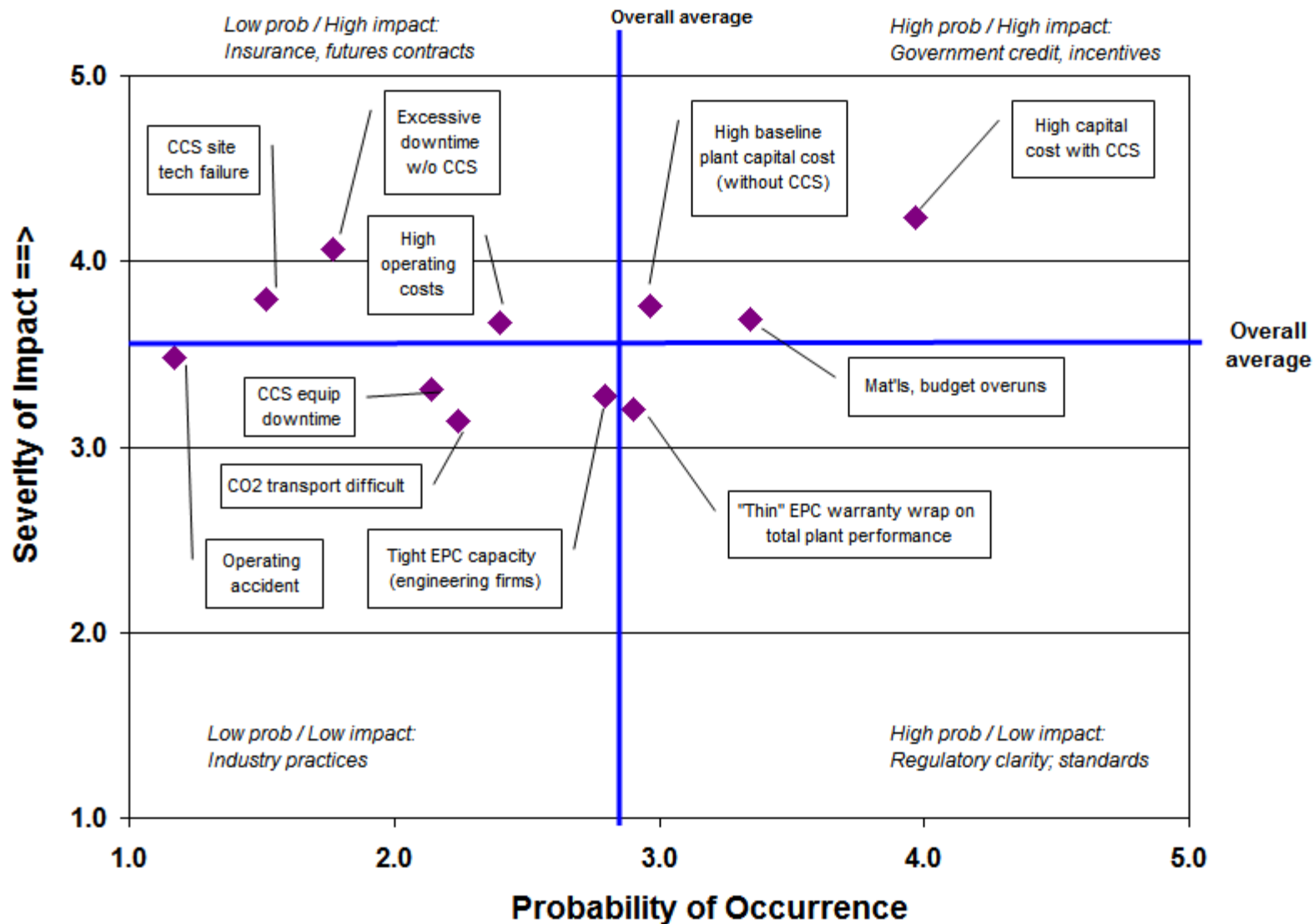


# Plot of Risks: Probability vs. Impact Reveals Nature



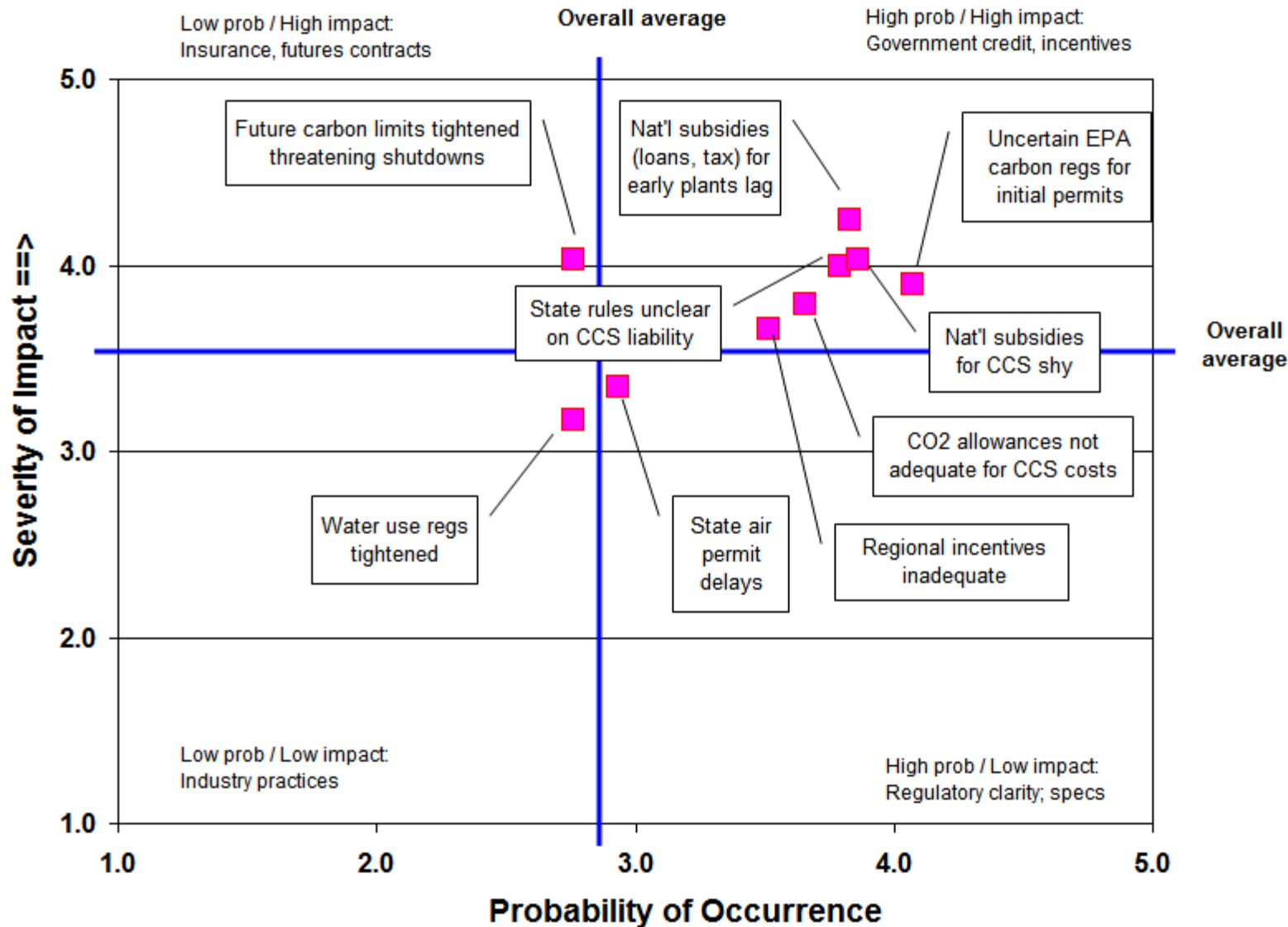
**Coal with CCS TECHNICAL Risks: Probability vs. Impact**

30 ratings



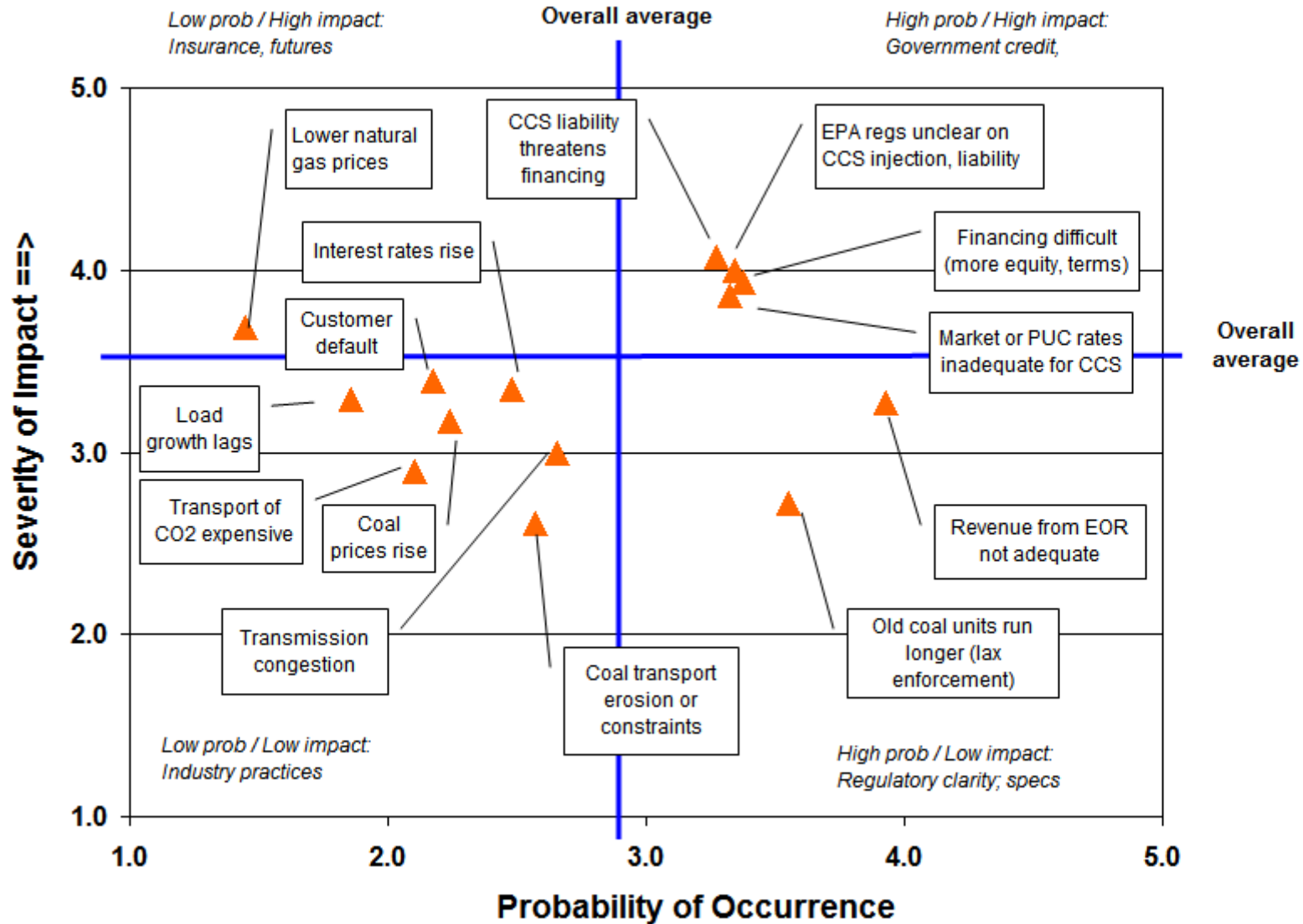
**Coal with CCS POLICY Risks: Probability vs. Impact**

30 ratings



**Coal with CCS MARKET Risks: Probability vs. Impact**

30 ratings



# **Background: CCS Alliance**

[www.ccsalliance.net](http://www.ccsalliance.net)

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## **□ Focus of the CCS Alliance:**

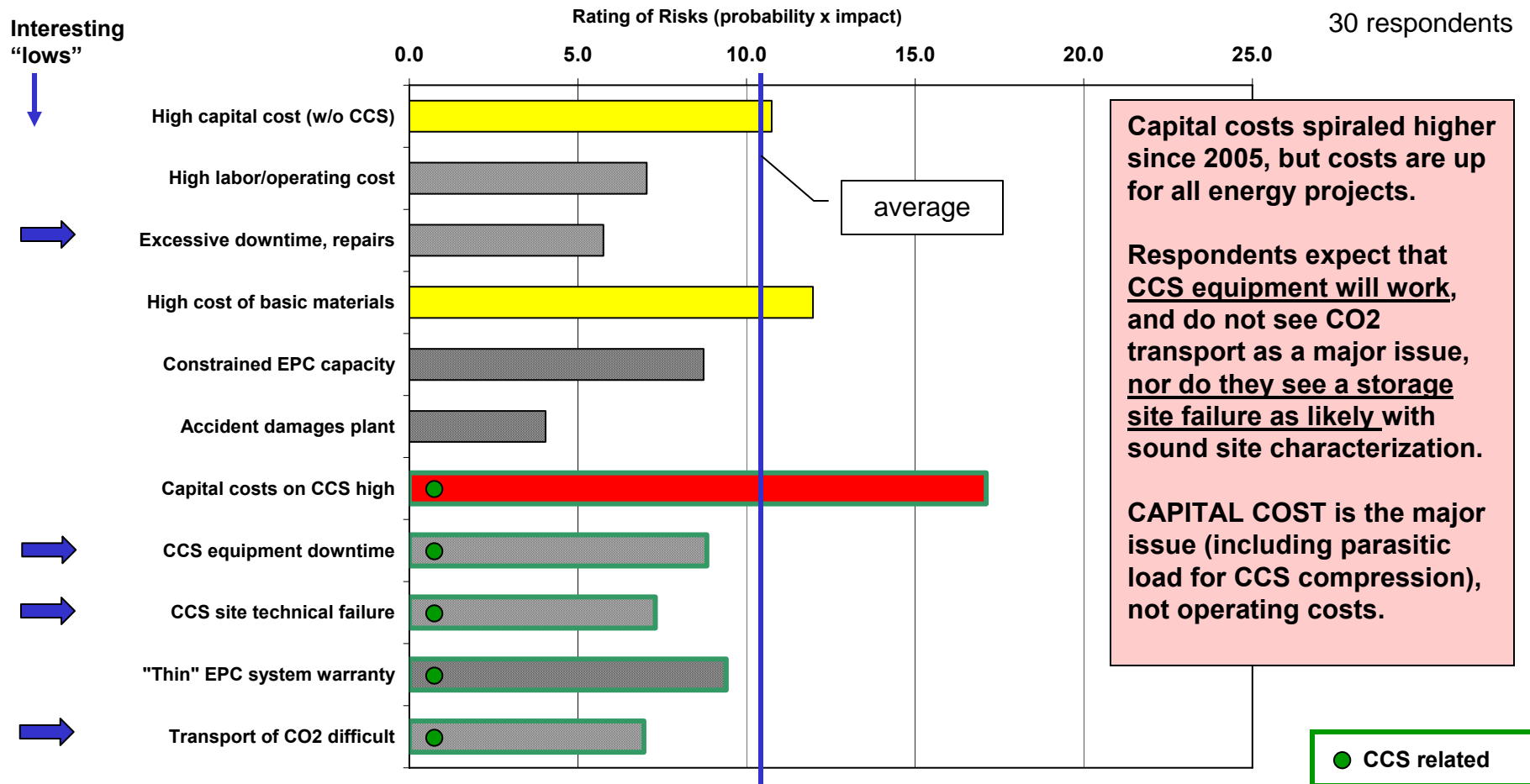
- A coalition of entities sharing a common interest in removing impediments to the investment in and development of CCS. (Rural coops, utilities, insurance, resource companies)
- Particularly focused on regulatory requirements regarding financial assurance, site closure certification, post-closure monitoring, and long-term liability.
- Addresses issues regarding the applicability of other federal environmental statutes, project and pipeline siting authority, subsurface property rights, and other issues.
- Promote the development of policy at state and federal levels to address CCS risk and liability issues appropriately. Work with regional partnerships on state level issues.
- Not limited to the power sector; industrial projects are important also for near-term progress.

## **□ Efforts and Accomplishments:**

- Conducted a comprehensive study of risk and legal liability issues, focusing on barriers posed by existing law and regulatory regimes to the commercial-scale deployment of CCS.
- Submitted comments on proposed CCS-related regulatory regimes, including EPA's proposed rule for underground injection wells (a new Class VI) under the SDWA.
- Communicated key issues to policy-makers regarding the treatment of liability and regulatory issues under proposed climate change and energy legislation.
- Examining the design and impact of a variety of incentives and regulatory approaches that stimulate investment and commercial deployment.

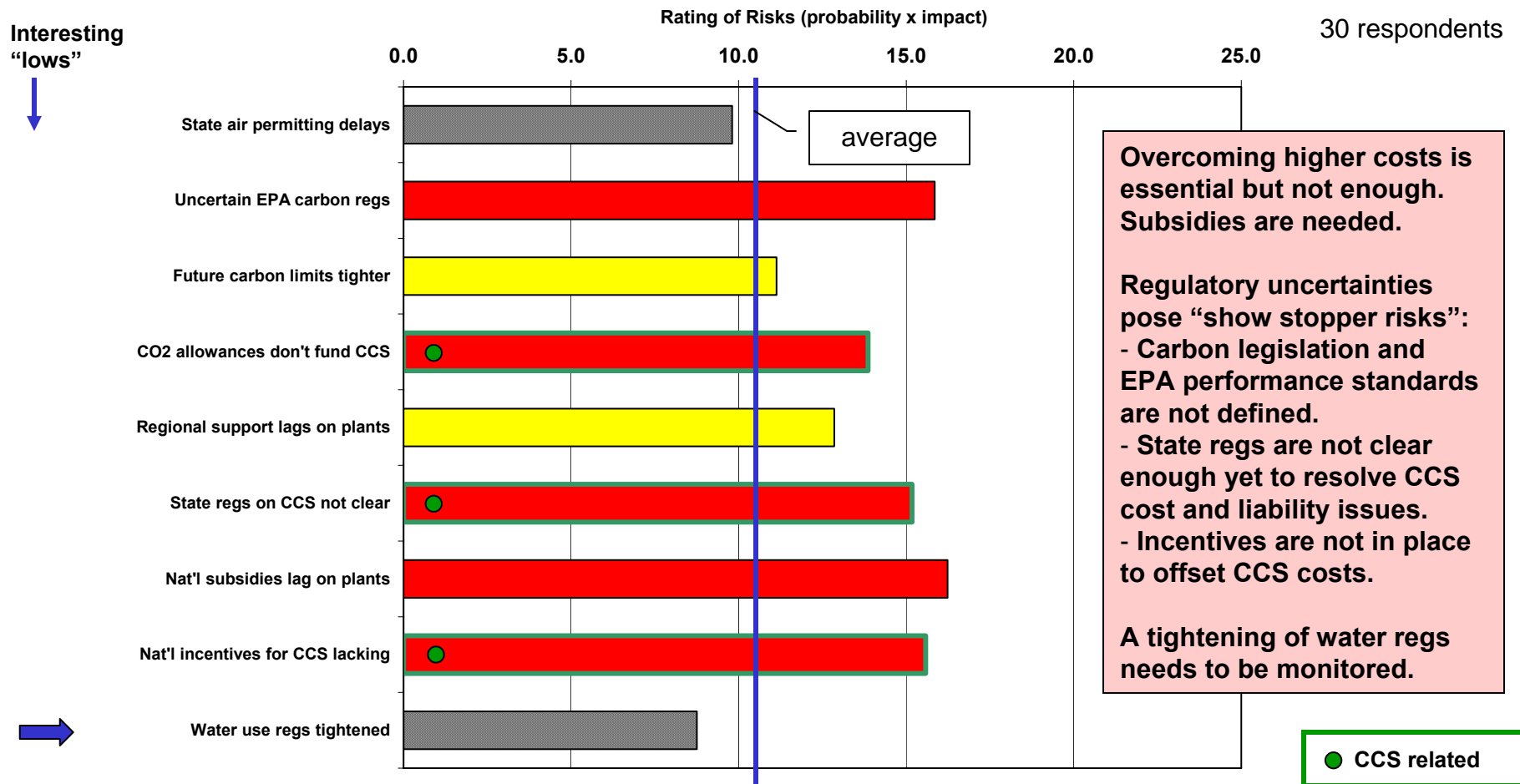
# Risk Ratings: TECHNICAL

Deploying CCS creates a large drain on plant production, so capital costs run much higher.



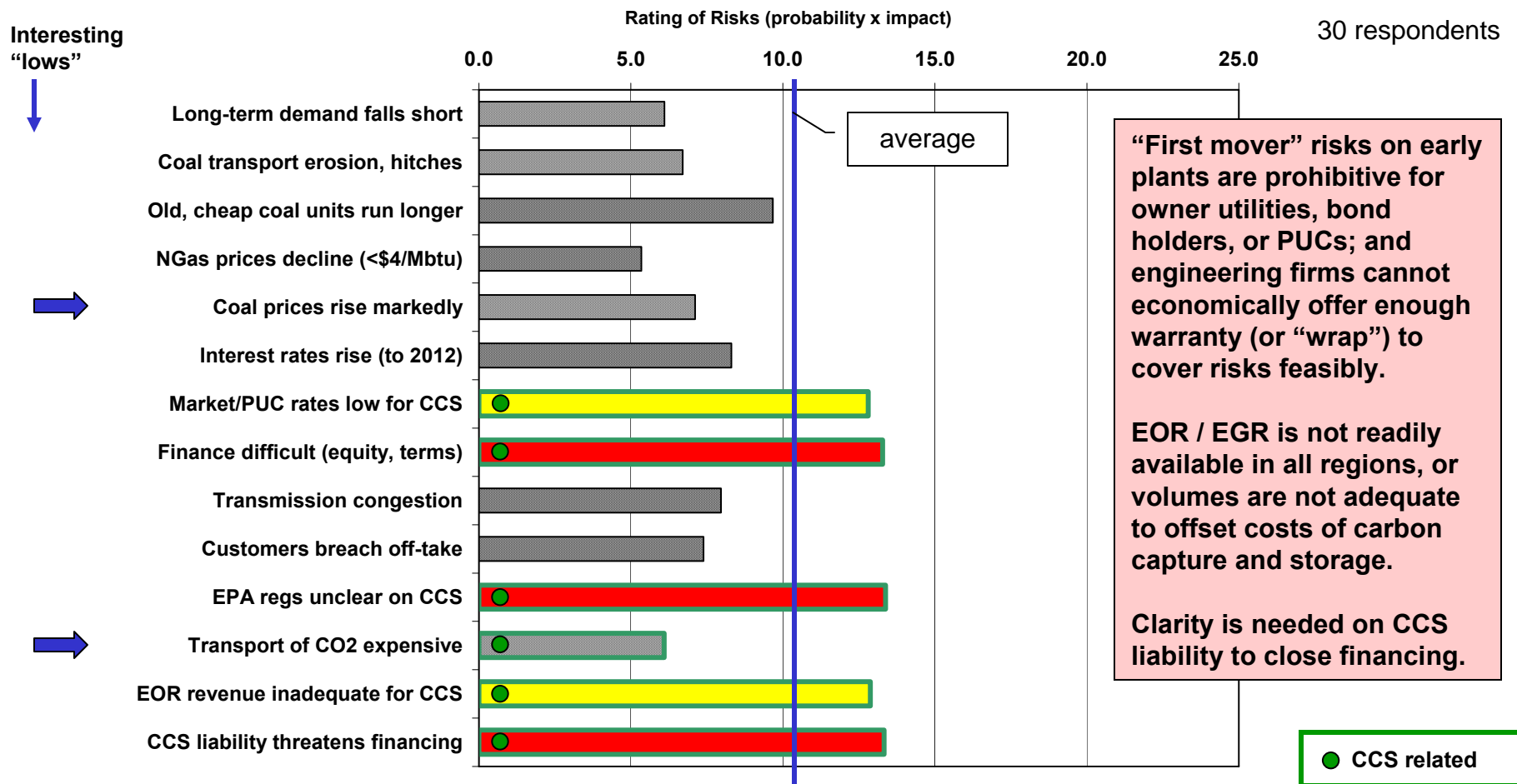
# Risk Ratings: REGULATORY / POLICY

Regulatory uncertainties (federal + state) about CCS costs and liability threaten financing.



# Risk Ratings: MARKET

Lack of subsidies and uncertainty about liability for CCS make financing very difficult.



## ***Risk Ratings on CCS – Observations***

- **Capital costs have run up since 2005, but costs are up for projects worldwide.**
- **Respondents expect that CCS equipment will work, and do not see CO<sub>2</sub> transport as a major issue, nor do they see a CCS site failure as likely.**  
**CAPITAL COST for the plant with CCS is the key barrier, not variable costs.**
- **Subsidies are needed to overcome higher costs, but that is not enough.**  
(Subsidies could be paid for by injection fees on CO<sub>2</sub>, or user levies on coal)
- **Regulatory uncertainties pose “show stopper” risks for deployment of CCS:**
  - Carbon emission legislation and EPA regulatory rules on CCS are not defined.
  - State regulations are not clear enough yet to resolve CCS cost and liability issues.
  - Incentives (tax credits, loans, allowances) are not in place to offset higher CCS costs.
  - A tightening of water regulations does not pose much of a risk currently.
- **“First mover” risks are prohibitive for owner utilities, bondholders, or PUCs; and engineering firms cannot economically offer enough warranty (or “wrap”) to cover risks. Few owners want to finance early CCS demos and plants.**
- **EOR is not readily available in all regions, or demand is not adequate to absorb costs and volumes needed for carbon capture and storage from power plants.**
- **Clarity is needed on CCS liability to close financing – perhaps a “showstopper”.**
- **Increases in coal prices or interest rates were not rated high risks.**
- **Lower NGas prices (<\$5) would pose competitive problems.**