State Legislative and Regulatory Actions: Review, Motivation, and Effects on Geologic Sequestration of Carbon Dioxide

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CCS Regulatory Project

California Carbon Capture and Storage Review Panel Meeting

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CCSReg project objective

Develop recommendations that would create a U.S. regulatory environment conducive to capture, transport, and deep geological sequestration (GS) of carbon dioxide (CO_2)

… by working with stakeholders and experts in the field, and building on work being done in this area by others

… with $2-million in funding from the Doris Duke Charitable Foundation over three years

Review, Motivation, and Effects of State Actions on Geologic Sequestration of CO_2

1. Define regulatory and legal obstacles to deployment of CCS technology
2. Identify actions states have taken to remove these obstacles
3. Describe broad trends in state actions, motivations behind the actions, and effects on GS

Obstacles to CCS deployment exist across all phases of the CCS chain

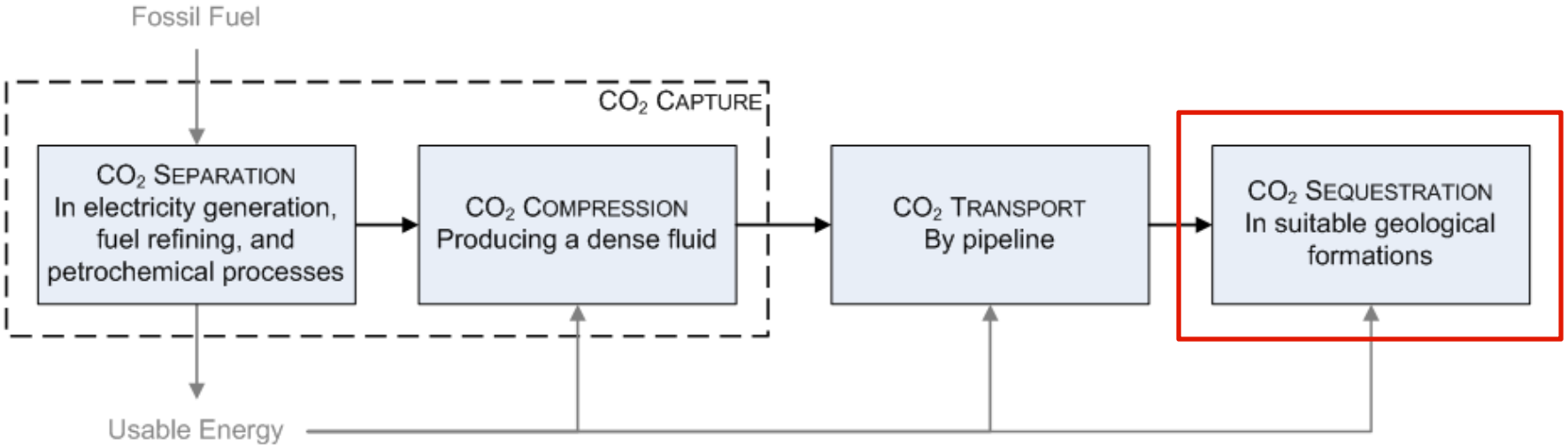
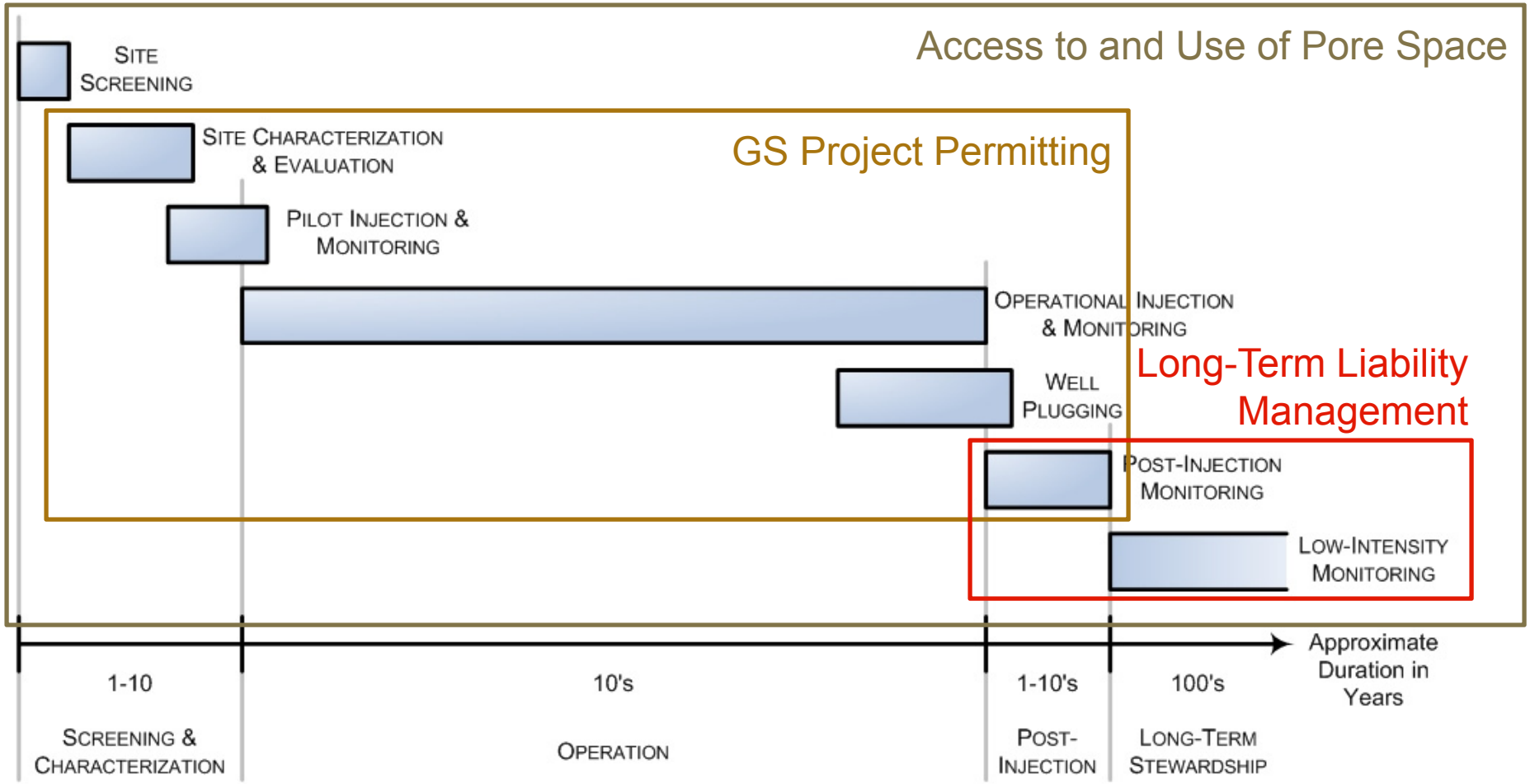


Photo: Vattenfall

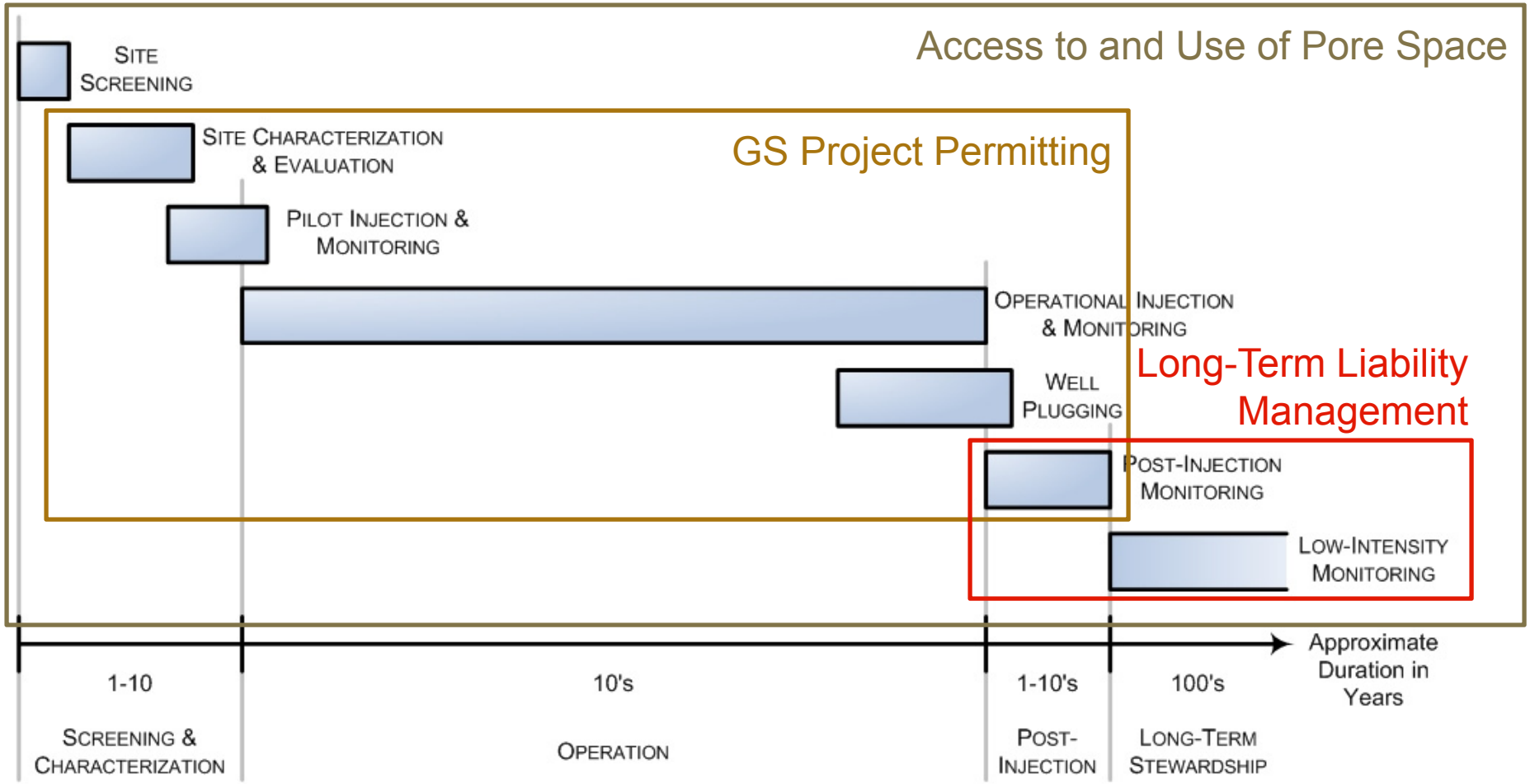
Photo: PTRC

Photo: DOE/NETL

We face three main obstacles to development of geologic sequestration projects



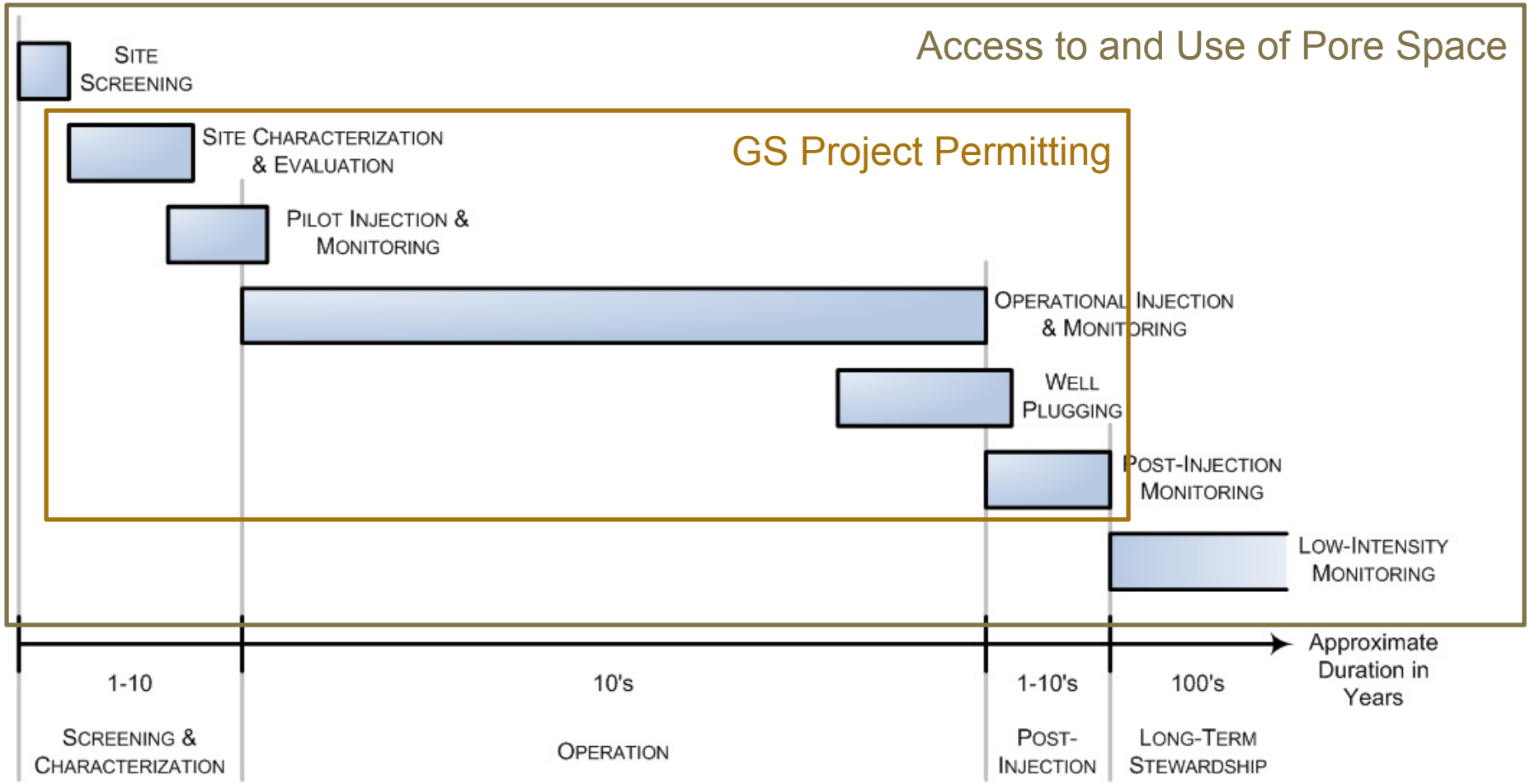
Consider how a project will gain access to pore space for sequestration of CO_2



Uncertainty is an obstacle to GS projects

1. Is pore space itself a stand-alone property estate, or it is merely a property right that is inextricably tied to the surface estate?
2. Is pore space an absolutely protectable property interest (e.g., does use alone require compensation)?
3. Would limiting absolute protection of pore space interests through legislation amount to an unconstitutional taking of private property (i.e., a regulatory taking)?

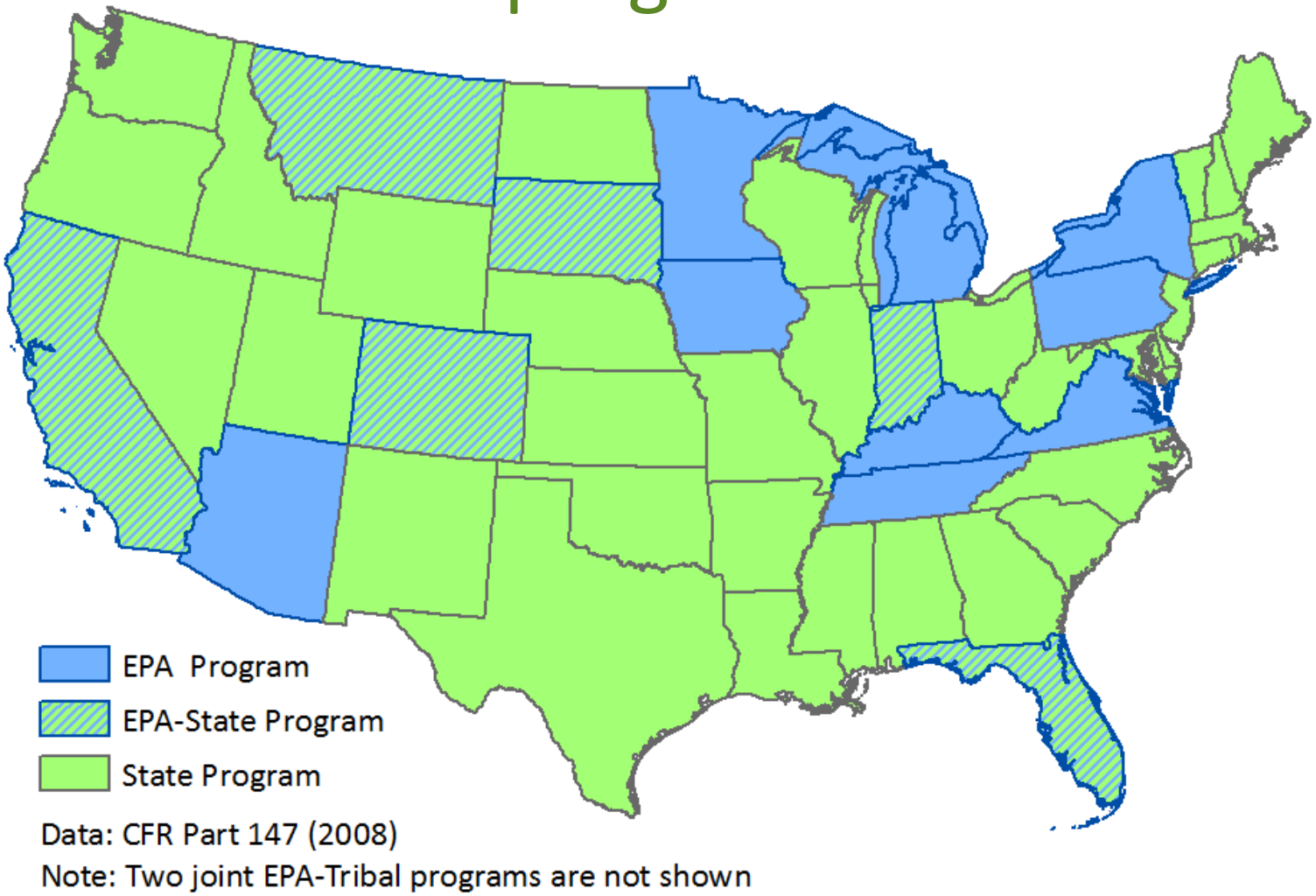
Consider how GS projects will be permitted



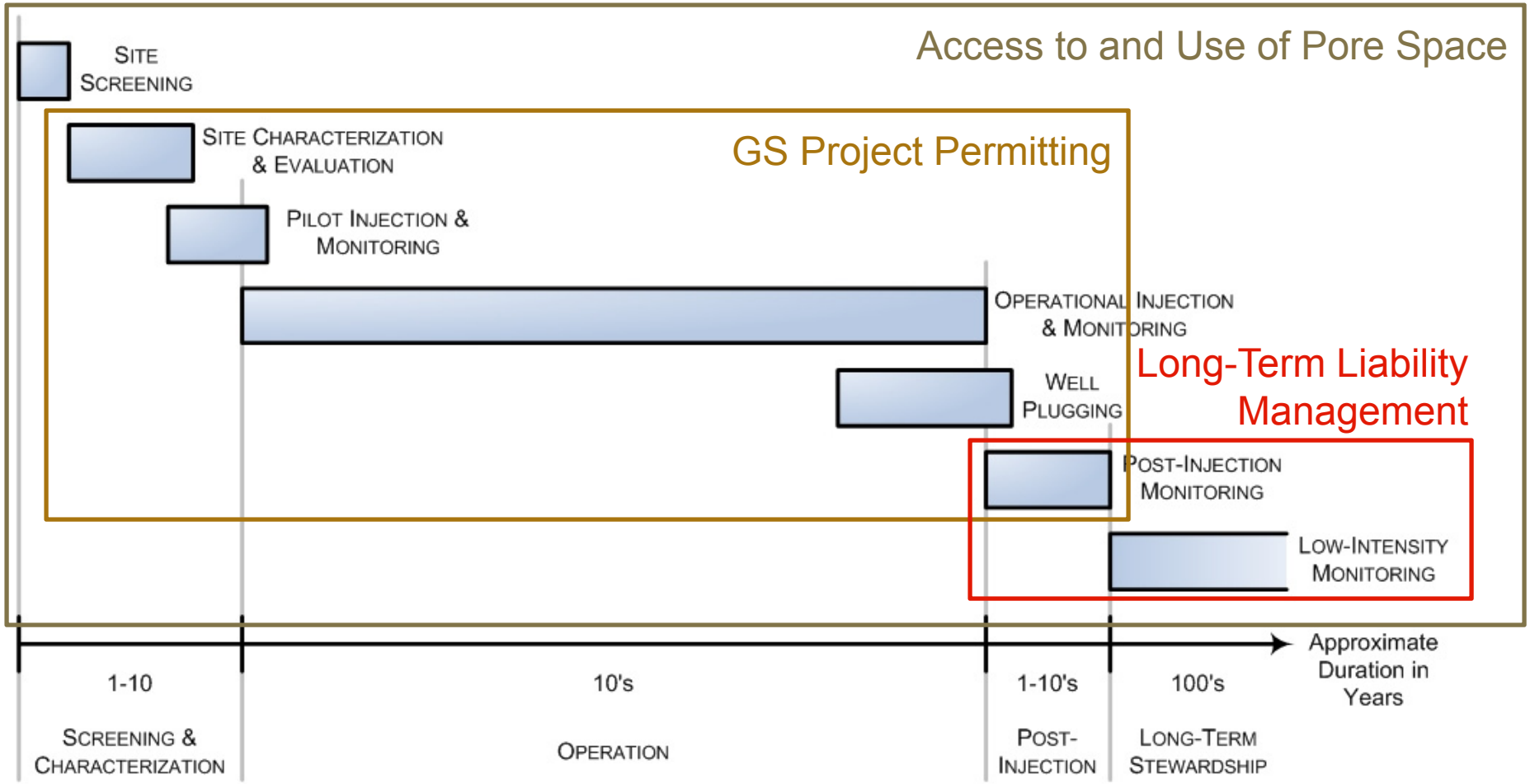
Permitting of GS projects will occur under the UIC program

- In the U.S., all injection of fluids into the subsurface is prohibited unless permitted by the Underground Injection Control (UIC) program or exempted by the same regulations
- EPA has proposed rules creating a new "well class" for GS projects:
  - Sets well construction standards
  - Establishes area of review (AoR) for GS projects
  - Establishes a post-injection period
  - Outlines financial assurance mechanism (*for operation only)*

States may obtain primacy for the UIC program



Consider how liability will be managed across the project lifecycle

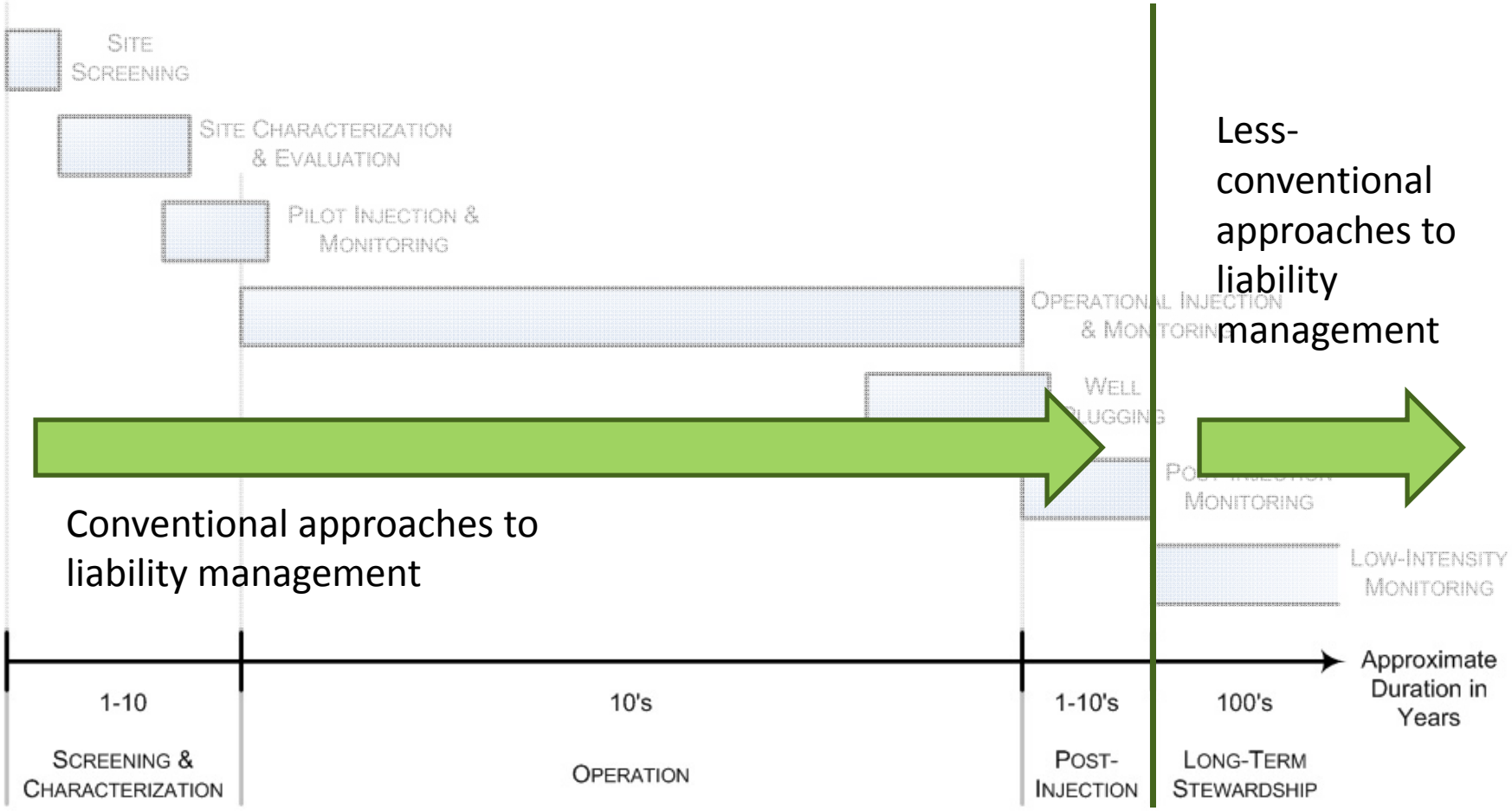


The three broad classes of liabilities and specific examples

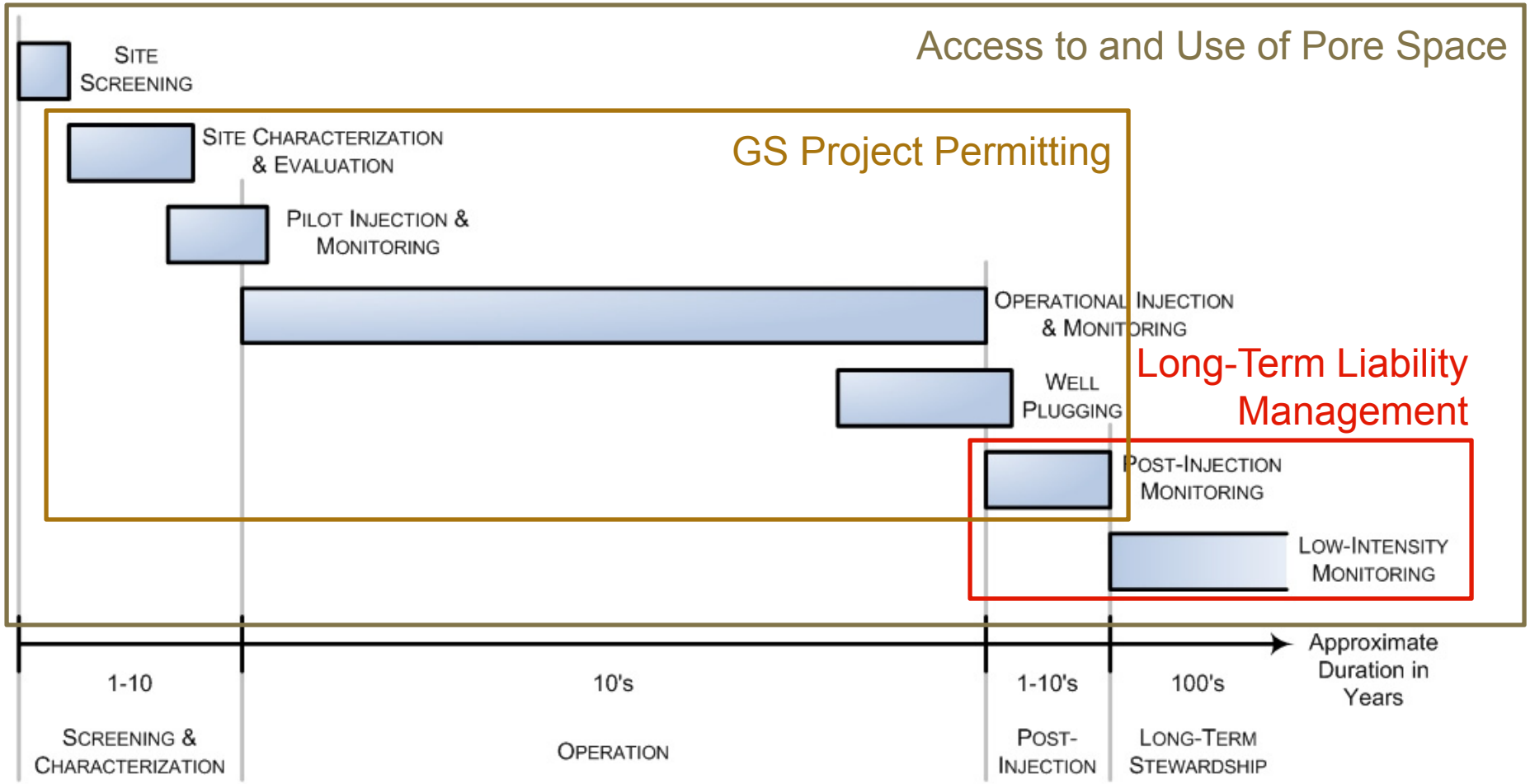
Obligation to pay for required activities prescribed by regulation	• Monitoring, verification, and accounting activities • Well abandonment
Obligation to pay for increased costs for required activities	• Business interruption, unanticipated performance changes • Changes in regulations
Obligation to pay compensatory damages arising from harm or injury during the lifecycle of the GS project	• Impacts to USDW • Leakage of CO_2 to the atmosphere under an emissions-reduction regime • Damage to other's mineral resources

Source: Trabucchi, Donlan & Wade, 2009

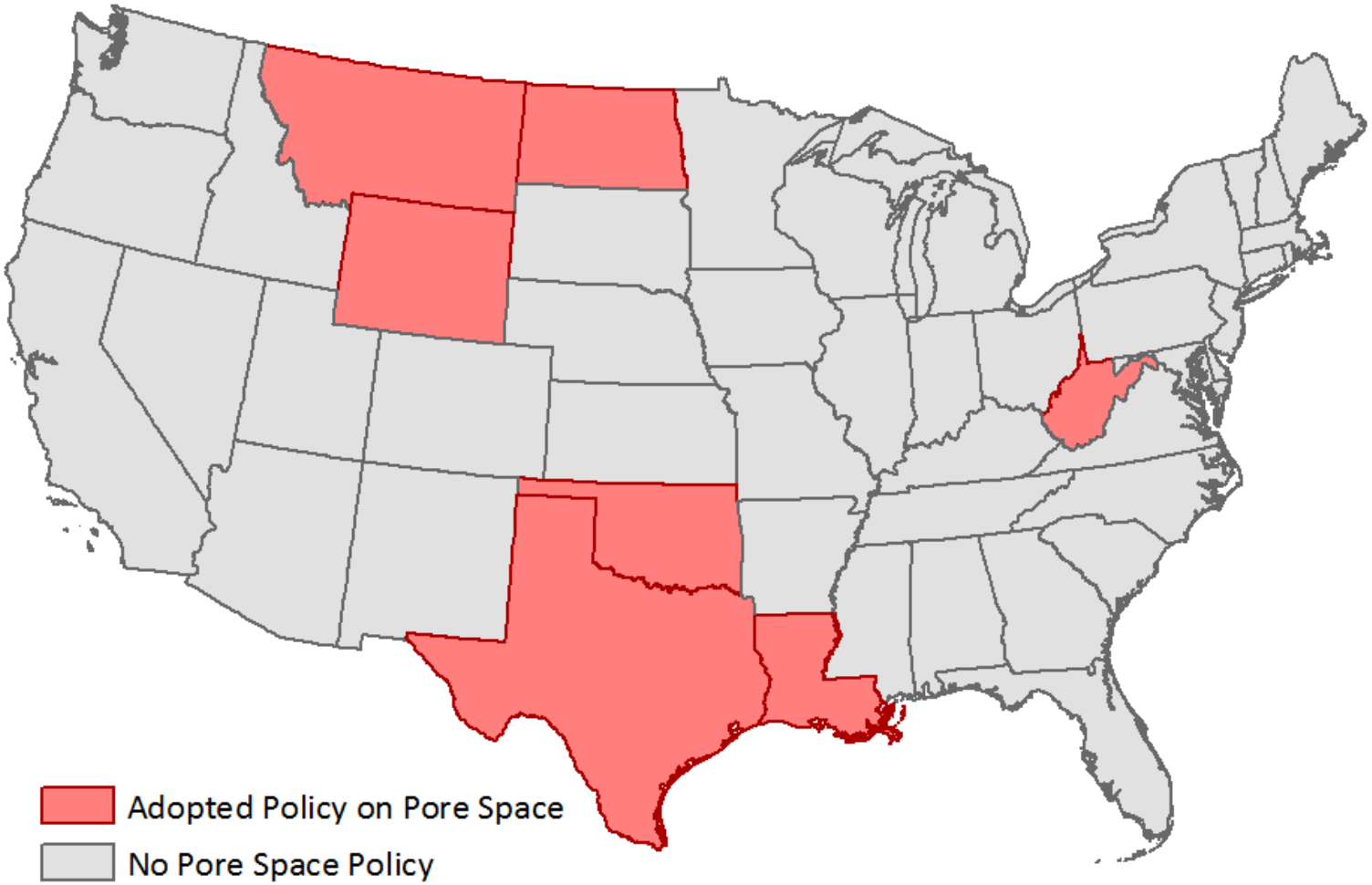
Liability management strategies depend on the project stage



State actions on Pore Space



Few states have acted on pore space issues, but precedents are being set



Three states have established that pore space is tied to the surface estate

Montana: SB 498 (2009)

Pore space is tied to the surface estate, unless deeds or severance documents establish otherwise

North Dakota: SB 2139 (2009)

Pore space is tied to the surface estate and *may not be severed*

Wyoming: HB 89 (2009)

Pore space belongs to surface owner and *may be severed*

Unitization is one mechanism to aggregate rights to a storage reservoir

Compulsory unitization, adapted from oil-field development, means that once a certain percentage of landowners have voluntarily committed to allow their pore space to be developed and used as a single sequestration unit, the remaining landowners may be compelled by law to join the unit

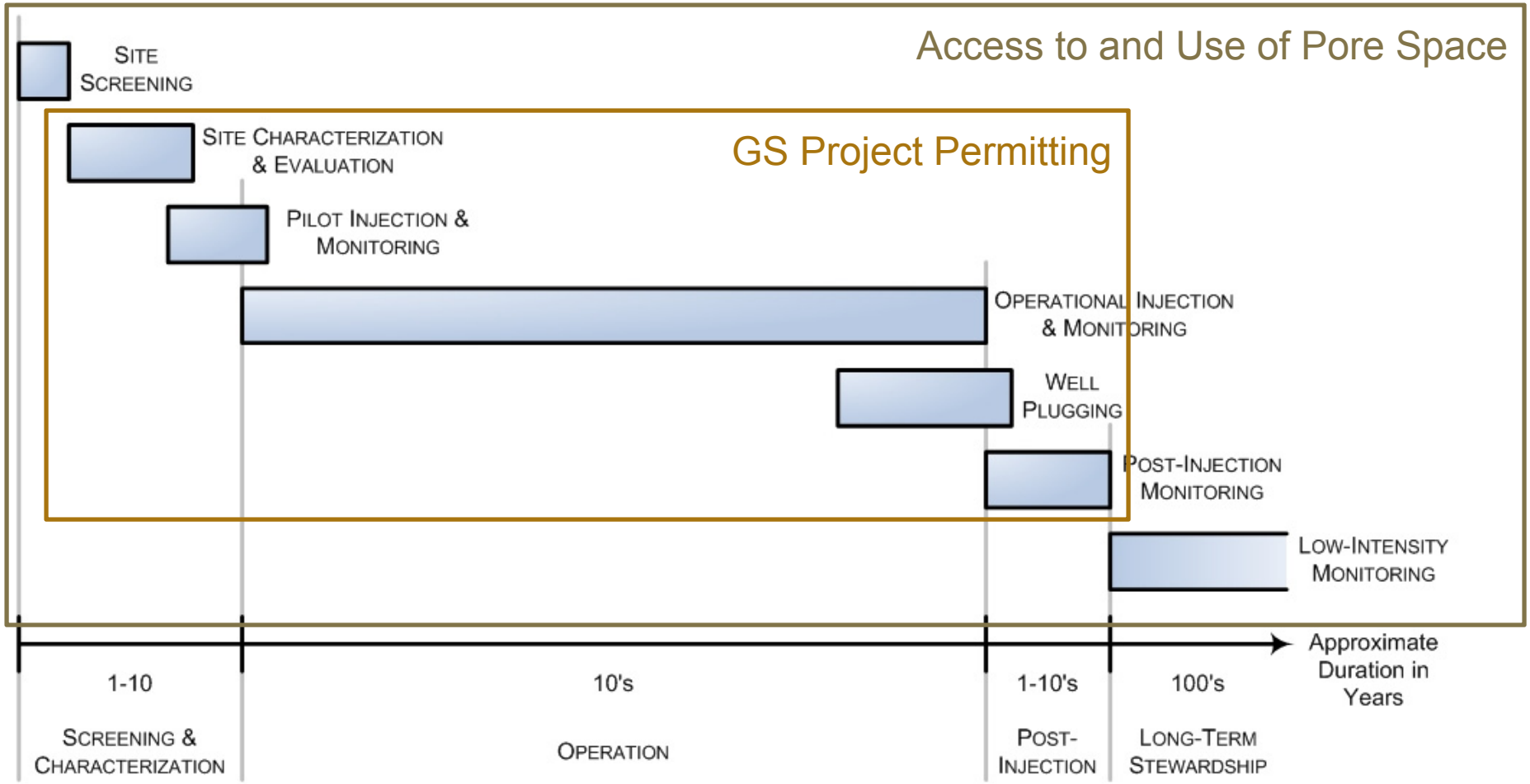
Montana	60%
North Dakota	60%
Wyoming	80%

Eminent domain is an alternative mechanism to unitization

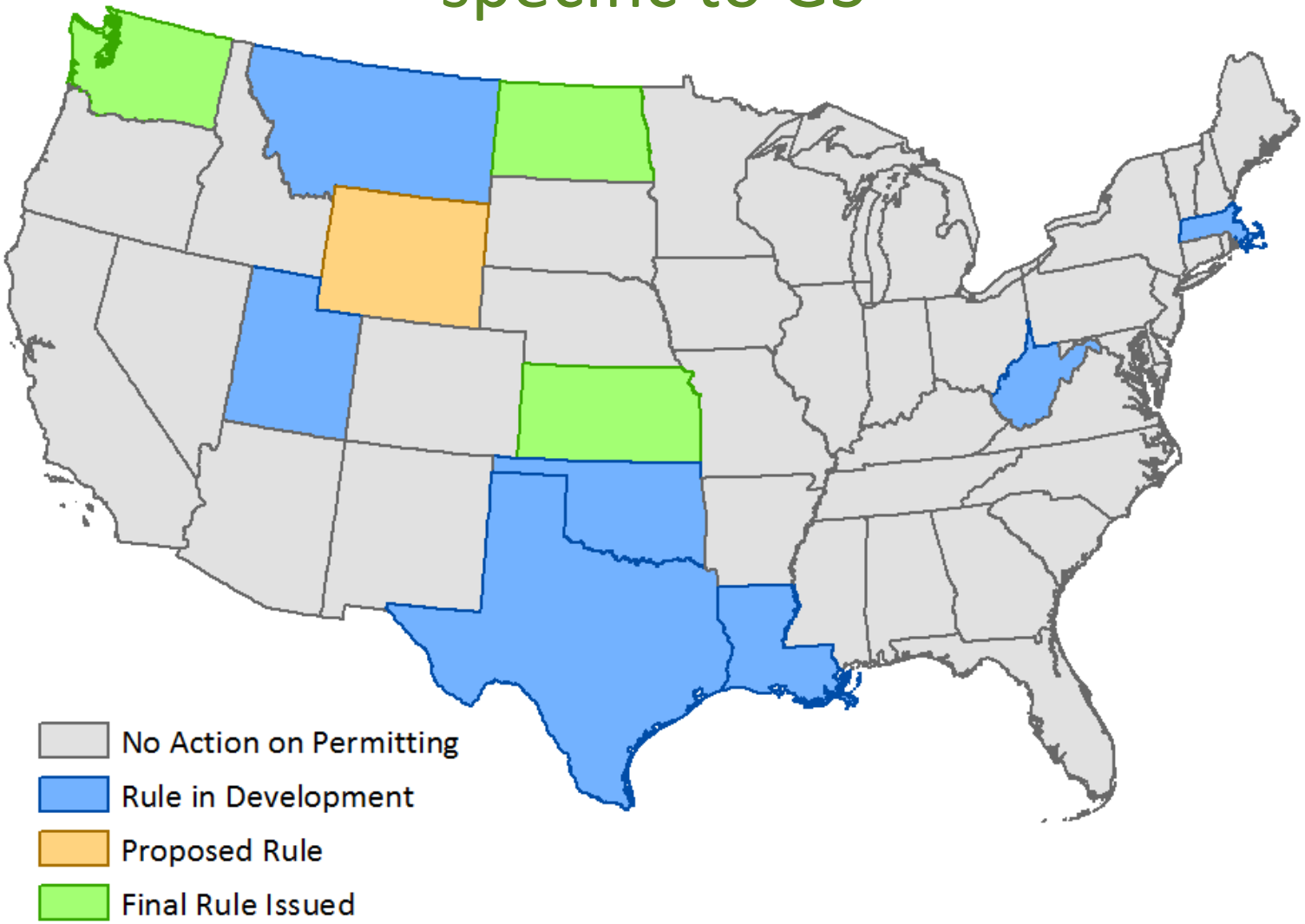
- Four states declare that GS is in the public interest, a prerequisite for use of eminent domain
- Only Louisiana, via HB 661 (2009), has established a process that would allow developers to obtain a certificate:

The commissioner can grant a certificate of public convenience and necessity to a storage operator, subject to certain findings, which authorizes the operator to exercise the power of eminent domain

State actions on Project Permitting



Eleven states are creating permitting rules specific to GS



States are choosing to delegate permitting responsibility to different agencies

Oil & Gas	• Kansas • Louisiana • North Dakota
Environmental	• Washington • West Virginia • Wyoming
Oil & Gas with input from Environmental	• Montana • Texas
Jurisdiction split between Oil & Gas and Environmental based on type of storage formation	• Oklahoma

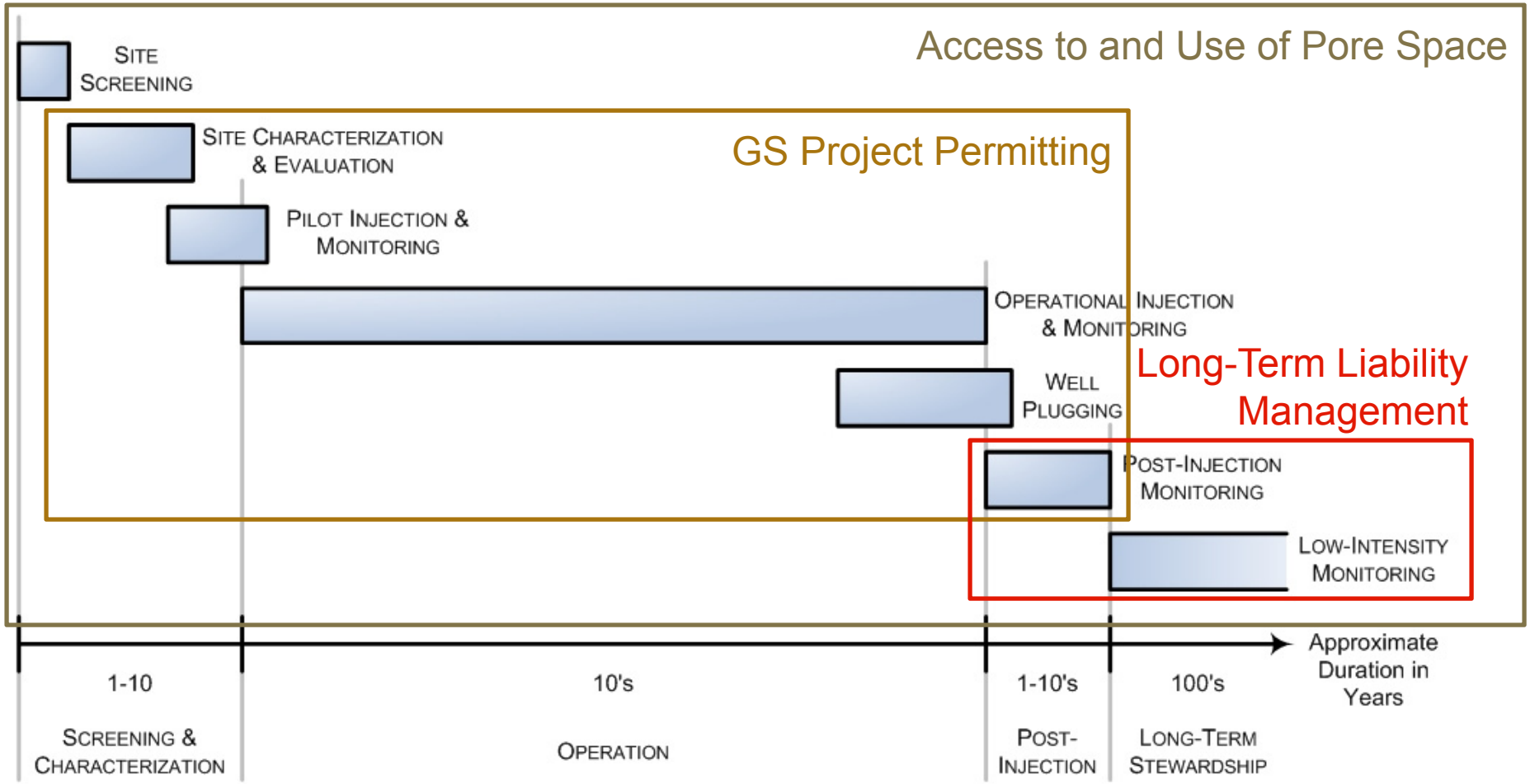
Four states, four different approaches

State	Status	Agency	Form of regulation
Kansas KAR 82-3-1100 to 1120	Final Adopted Feb. 2010	Corporation Commission	Freestanding permit for CO_2 storage facility
North Dakota 43-02-04.1	Final Adopted Nov. 2009	Industrial Commission	Freestanding permit for CO_2 storage project
Washington WAC 173-218-115	Final Adopted July 2008	Dept. of Ecology	State implementation of UIC class VI rules
Wyoming Water Quality Rules and Regs. Chap. 24	Draft	Dept. of Environmental Quality	State implementation of UIC class VI rules

Financial assurance mechanisms to ensure projects are properly closed are included

State	Financial Assurance requirements
Kansas	• Demonstration of financial responsibility to ensure proper operation and closure of the CO_2 storage facility, as approved by the Director.
North Dakota	• Performance bond covering surface facility in an amount established by the Commission. • Performance bonds for each CO_2 injection and observation well in amount established by the Commission.
Washington	• Operator shall establish a closure and post-closure account to cover all closure and post-closure expenses.
Wyoming	• Public Liability Insurance policy (or self insurance) for GS operations. • Bond or other financial assurance to cover cost of meeting permit requirements, including monitoring, remediation and site closure.

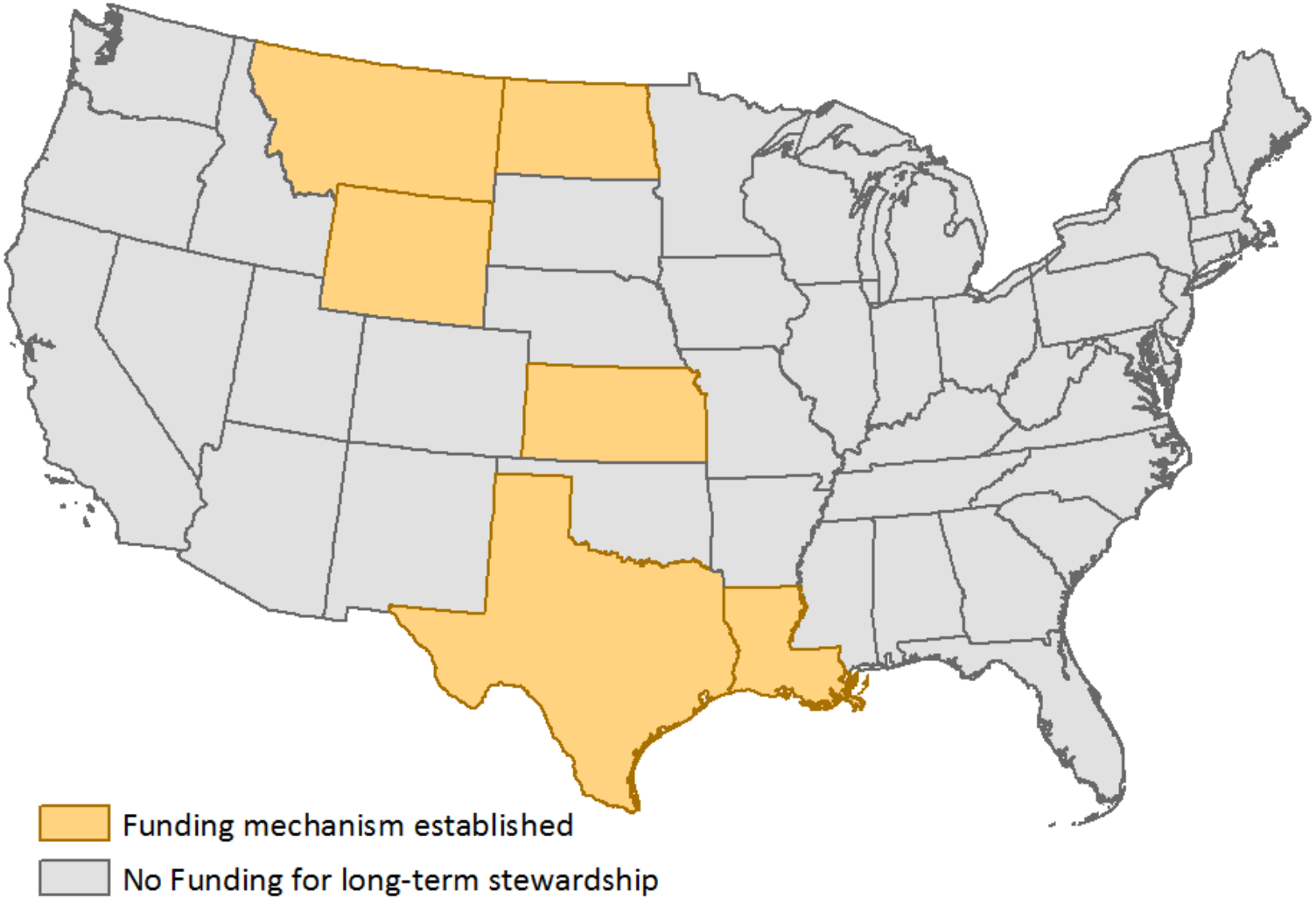
State actions on Long-Term Liability Management



Criteria for site closure vary from state to state

State	Requirements for closure	Consequences of closure
Kansas	• CO_2 plume is stabilized, contained, an not a threat to public health, safety and usable water • CO_2 reservoir pressure is stable	• CO_2 storage facility permit is revoked • Monitoring and remediation paid for by state trust fund
North Dakota	• Show position and characteristics of injected CO_2 • Reservoir is reasonably expected to retain mechanical integrity	• Bond is released • Monitoring and remediation become responsibility of designated state or federal agency
Washington	• Little or no risk of future env. impacts and high confidence in effectiveness of the containment system	• Funds remaining in financial assurance account are released
Wyoming	• >10 years after injection stops • 3 years of monitoring data showing plume has stabilized • CO_2 will not present a risk to human health, safety or the environment	• All financial assurance instruments released • Monitoring and remediation paid for by state trust fund

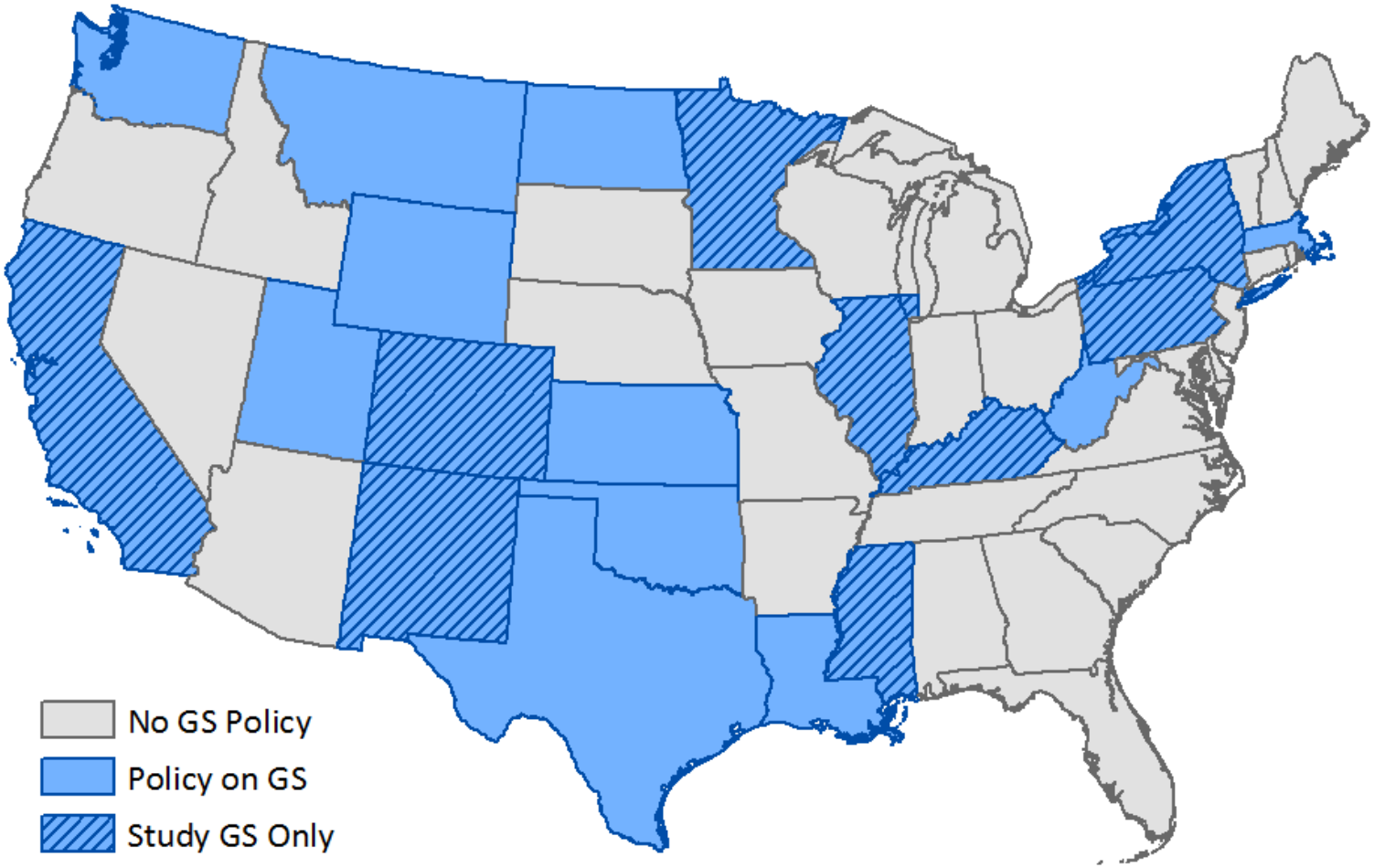
Six states have established funding mechanisms for long-term stewardship



Other aspects of long-term liability are not being addressed by states

State	Long-term stewardship fund	Responsibility for post-closure site management	Transfer of all liabilities to state
Kansas	Yes	State	No
Louisiana	Yes	State	No
Montana	Yes	State	Yes
North Dakota	Yes	State or Federal	Yes
Texas	Yes	State	No
Washington	No	Not addressed	No
Wyoming	Yes	State	No

Eleven states have acted in a definitive way on the legislative and regulatory obstacles



Strategic purpose of GS legislation varies

Economic development

Carbon dioxide is a valuable commodity to the citizens of the state, particularly for its value in enhancing the recovery of oil and gas and for its use in other industrial and commercial processes and applications.

- Oklahoma S.B. 610 (2009)

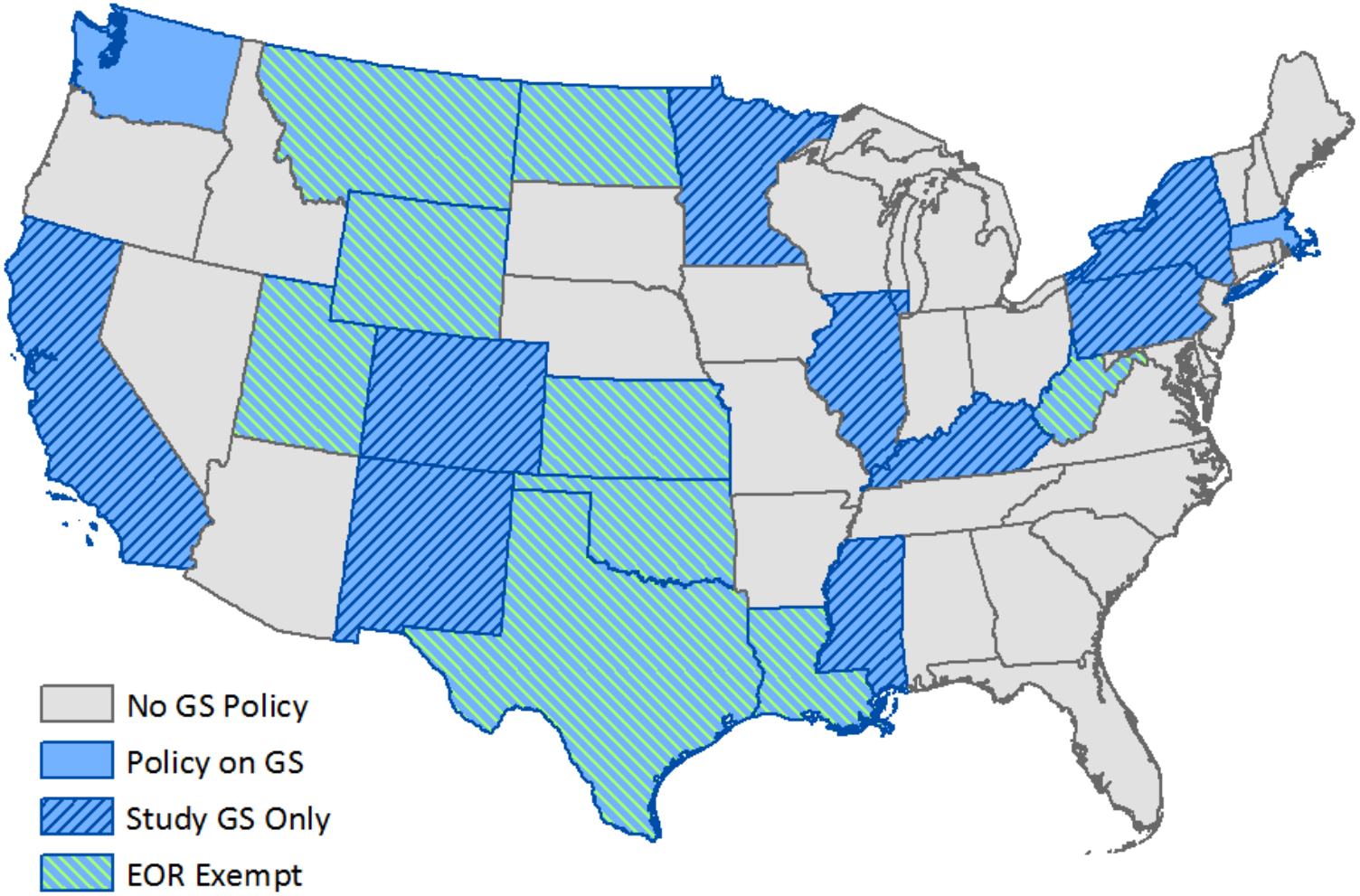
GHG Emissions Reduction

The geologic storage of carbon dioxide will benefit the citizens of the state and the state's environment by reducing greenhouse gas emissions.

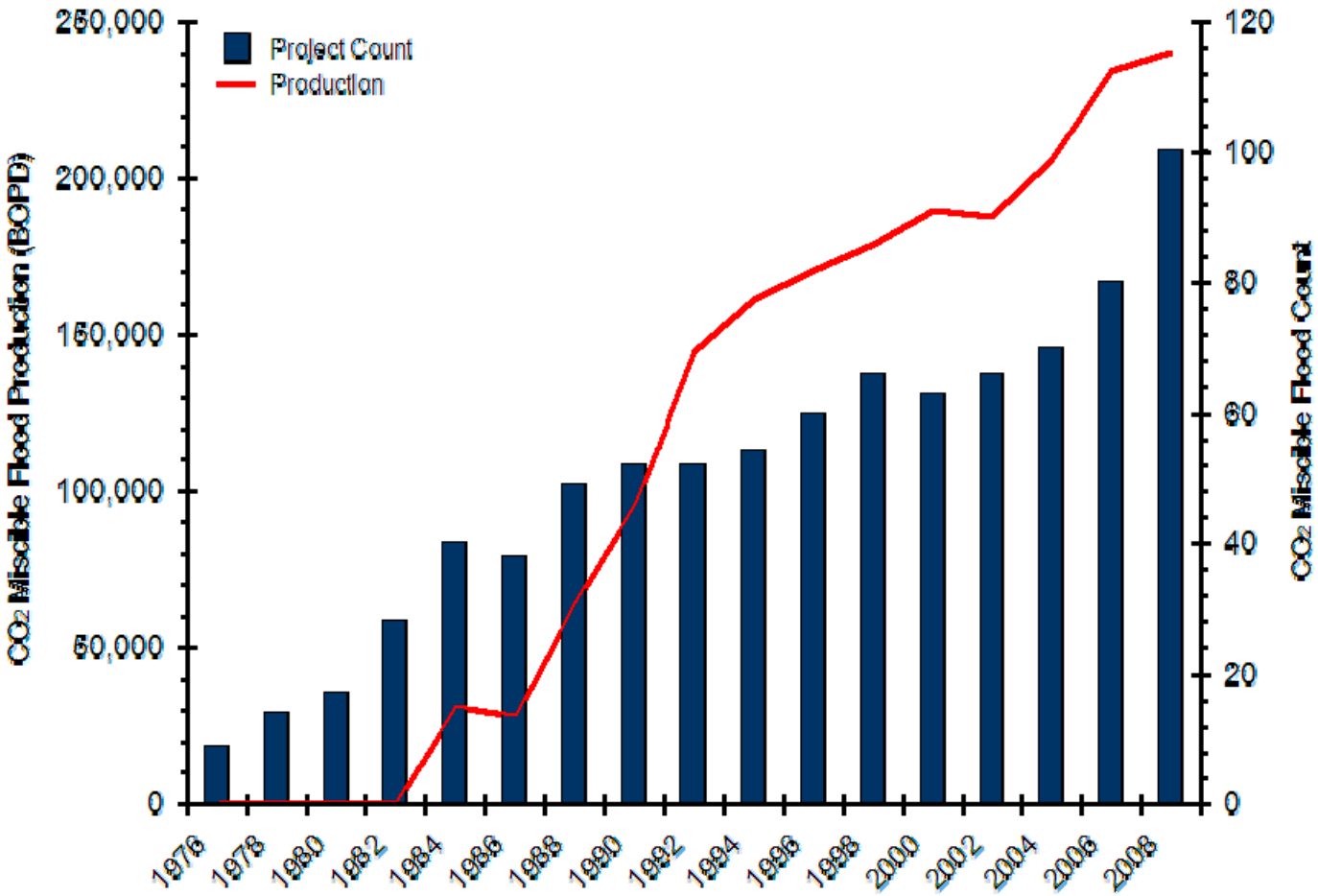
- Louisiana H.B. 661 (2009)

	Economic Development	GHG Emissions Reduction
Louisiana	●	●
Montana	●	
North Dakota	●	●
Oklahoma	●	
Washington	●	●
West Virginia	●	
Wyoming	●	

Nine of the eleven states taking action on GS have excluded CO_2-EOR from policies



CO_2-EOR production has grown rapidly in the last decade



Data: 2008 Oil & Gas Journal EOR Survey

Critical issues in CO_2-EOR have not been addressed by states

- Current actions largely protect EOR business as usual
- If states wish to see EOR become an emissions reduction strategy, several issues must be addressed:
  1. Conversion from EOR to GS
  2. Long-term liability
  3. Carbon credits

We see several patterns in GS policy activity

1. Driver was GHG cap: Washington, earliest actor
2. Protect EOR BAU and develop potential GS business: EOR states (e.g., Oklahoma)
3. Keep coal viable in carbon constrained world: Coal states (e.g., Wyoming)
4. Policy is developing in most areas key to GS deployment; Illinois and Michigan basins lag
5. Disconnect between GS policy and climate policy

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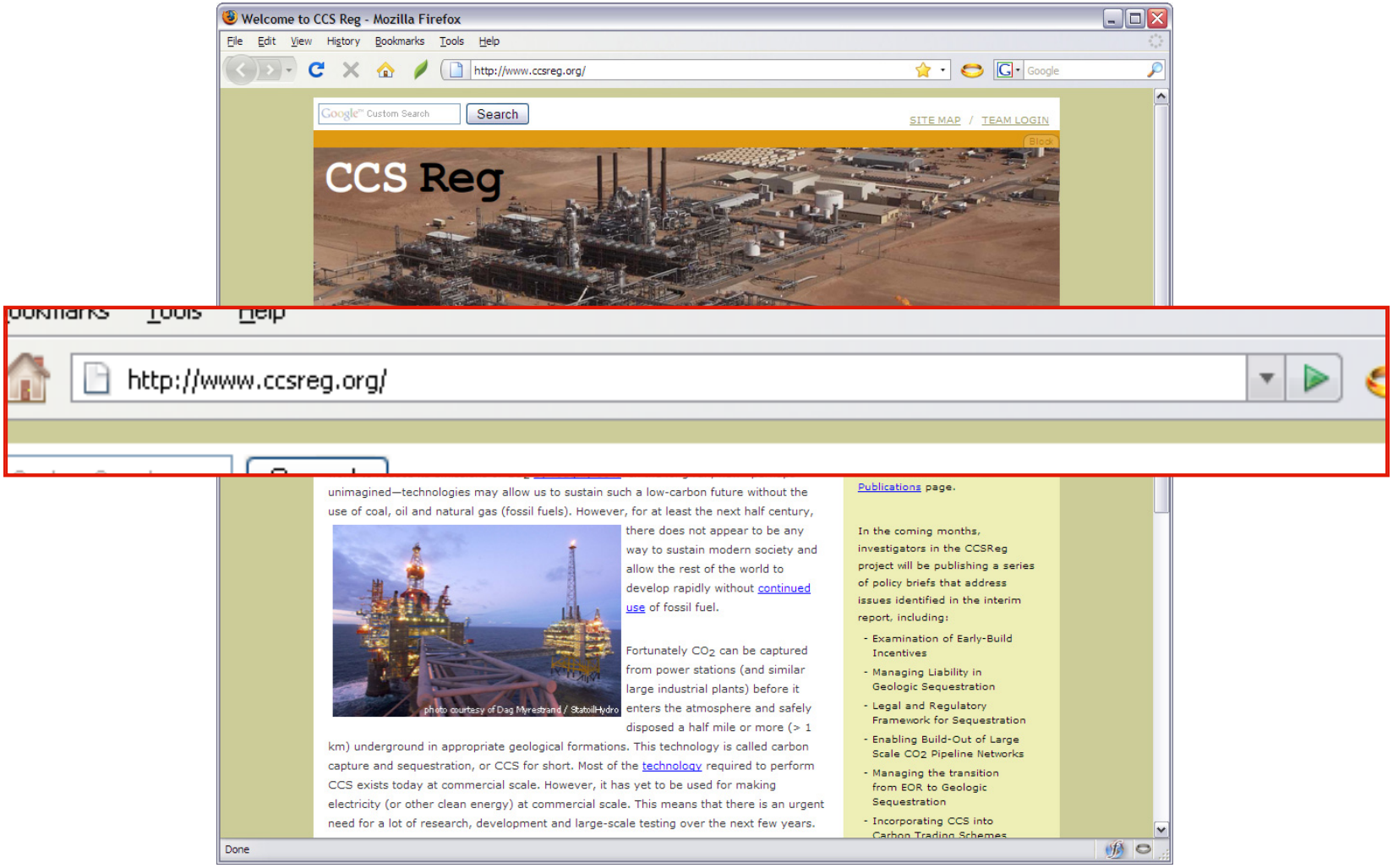
Project materials are available on the CCSReg project website



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