# Societal Issues Impacting CCS Deployment

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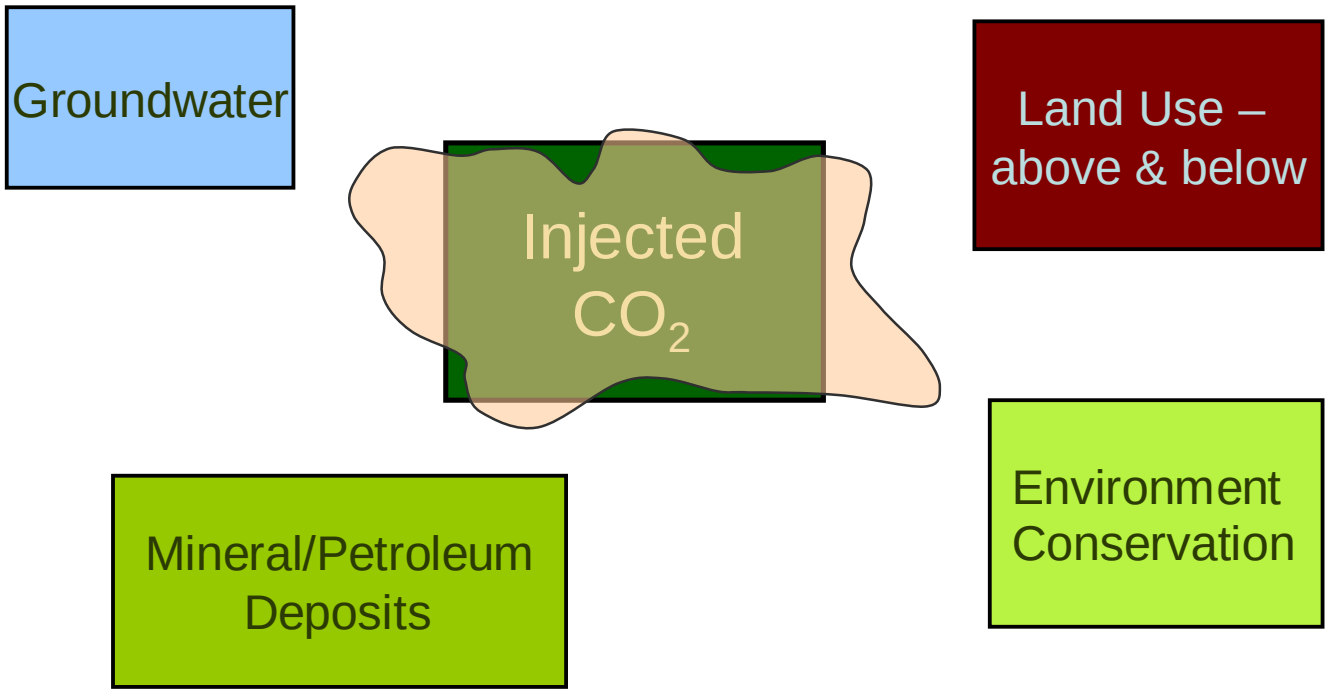
# *Proposed Taskforce to Examine Societal Issues Impacting CCS Deployment*

- Explore issues of land use co-management (petroleum, water, coal)
- Consider matters of community interest e.g. urban areas, national parks, groundwater
- Societal expectations, public acceptance
- Focus on Technical findings as to how geological storage is different to oil and gas subsurface practices and knowledge
- Examine differences emerging between :
    - "technical assurances"
      versus
      "community perception"

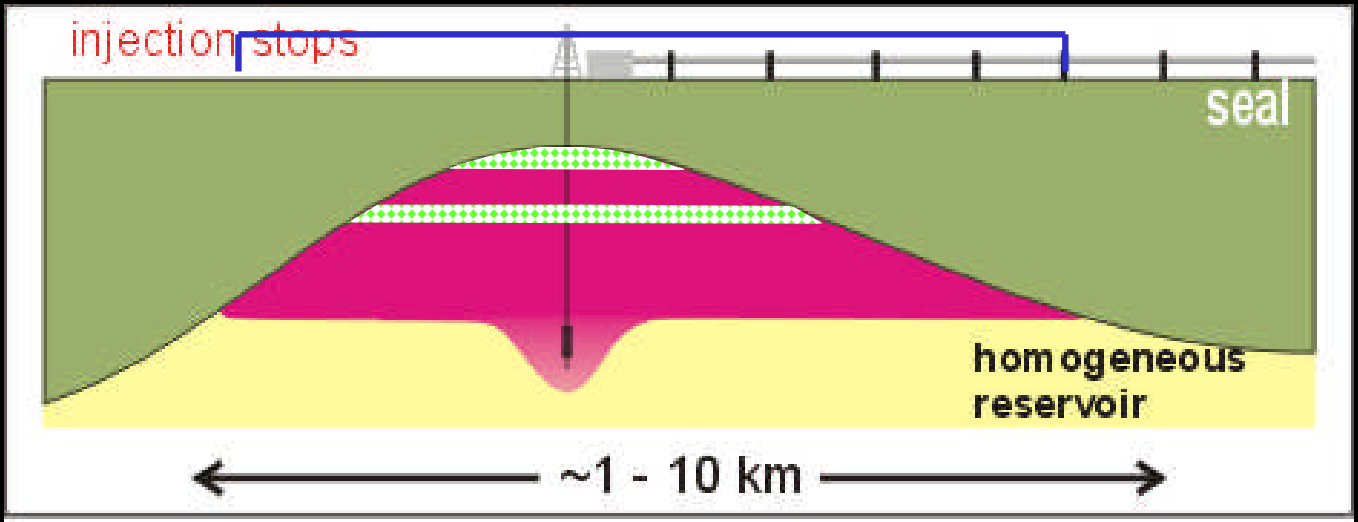
# Issues to explore

- Migration of $CO_2$
- Difference from other subsurface industries
  - Time and volume
  - Injection not extraction
- Complexities of interactions with other subsurface activities & stakeholders
- Are we across these matters
  - Technically
  - Legally
- Dealing with Public acceptance / communication (Anne Marie Thompson)

# Need to use Catchment / Reservoir Management Concepts



# Conceptual $CO_2$ Storage Scenario
## depleted field / structural trap

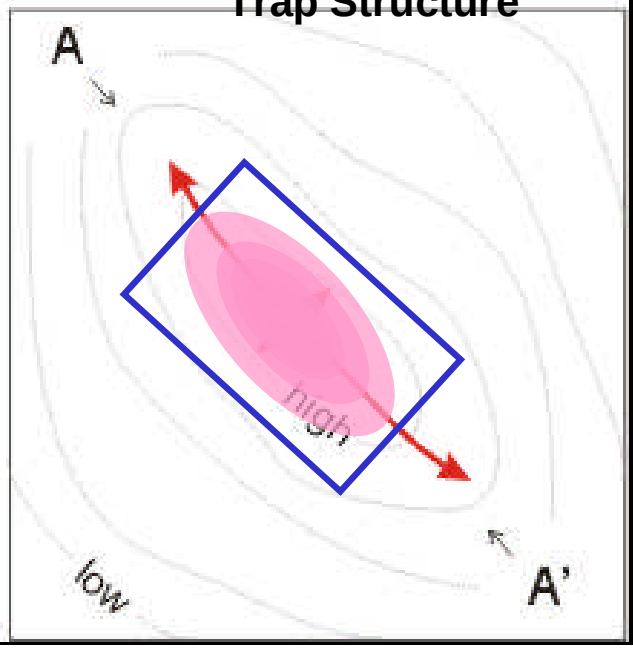



**Assigning permits & rights relatively easy – tightly constrained**

**But what if hydrocarbon discovery already exists, or believed to exist in structure? EOR - Sequenced development?**

**Or hydrocarbons found later - Which operator? – Who gets priority?**

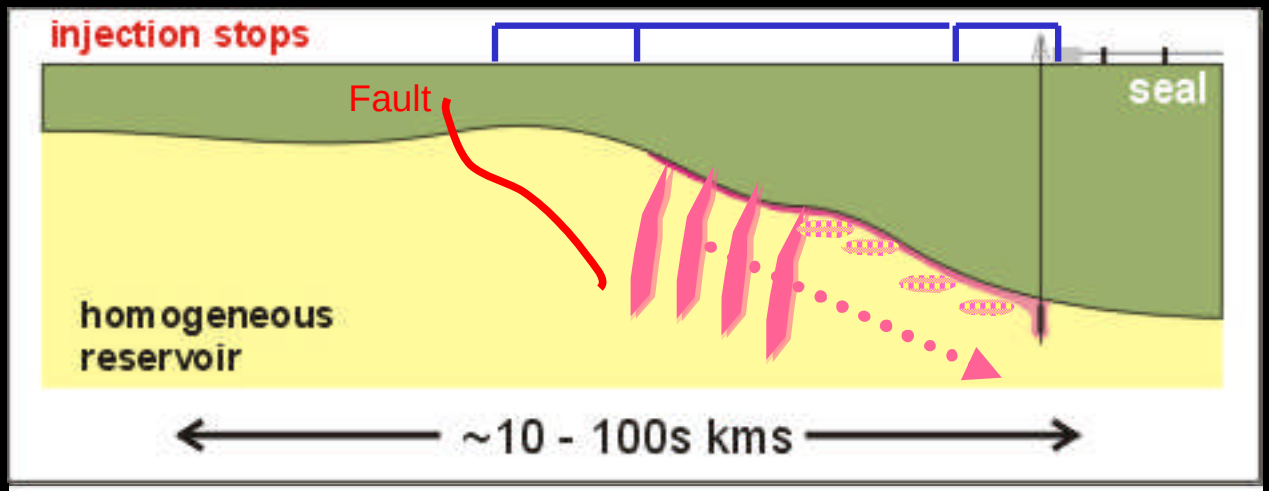
**Trap Structure**




(template slide courtesy of Robert Root)

# Conceptual $CO_2$ Storage Scenario

## hydrodynamic / residual gas / solution trap

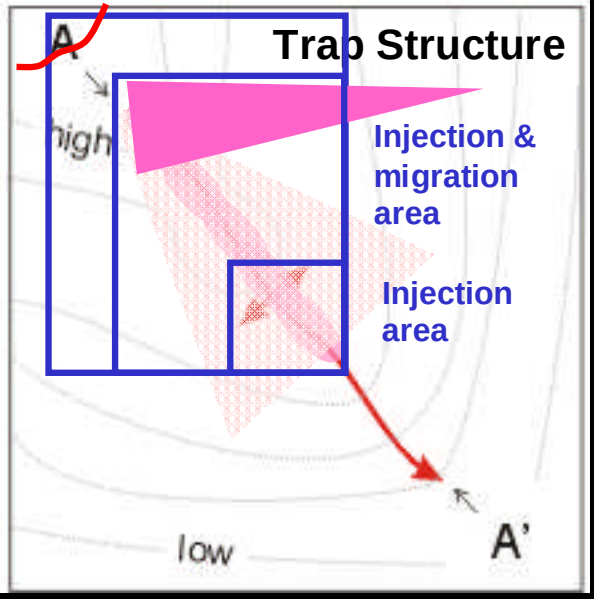



**Where do you put permit boundaries ?**

**How big do you make permits?**

**What access rights do you employ & allow for?**

**What if there are two storage operators – co-mingling of $CO_2$?**




(template slide courtesy of Robert Root)

# Migratory & Transient Issues

- Migration pathways not certain
  - But predictable
- Timing of $CO_2$ migration not certain
  - Will learn with experience
- Volumes of $CO_2$ being injected will mean static (structural) trapping will not have sufficient capacity to match supply
  - Highly reliant on dissolution trapping
  - Requires migration to be effective
  - Has a time component as well – not immediate

# Migratory & Transient Issues

- Technically we are challenged by these issues
- How do we communicate uncertainty to the public
- How do we legislate for these uncertainties in the subsurface
- .. This is why we proposed original taskforce …

  … improved technical and legal consensus on how to manage these matters …. and …

- …. To get some understanding of how the community will consider these technical and legal complexities?

# Long Term Liability and Monitoring

- Potential conflict between industry and government over who should assume long-term liability
  - Is it really any different to O&G operations or other mining operations (apart from economics)?
  - If government assumes liability from start, how does that affect risk profile of approving projects – bureaucracies traditionally risk averse?
  - How do you communicate and get acceptance from community on above

# Public Perception

Public acceptance of CCS as a safe and effective greenhouse mitigation technology essential to gaining public support for new projects.

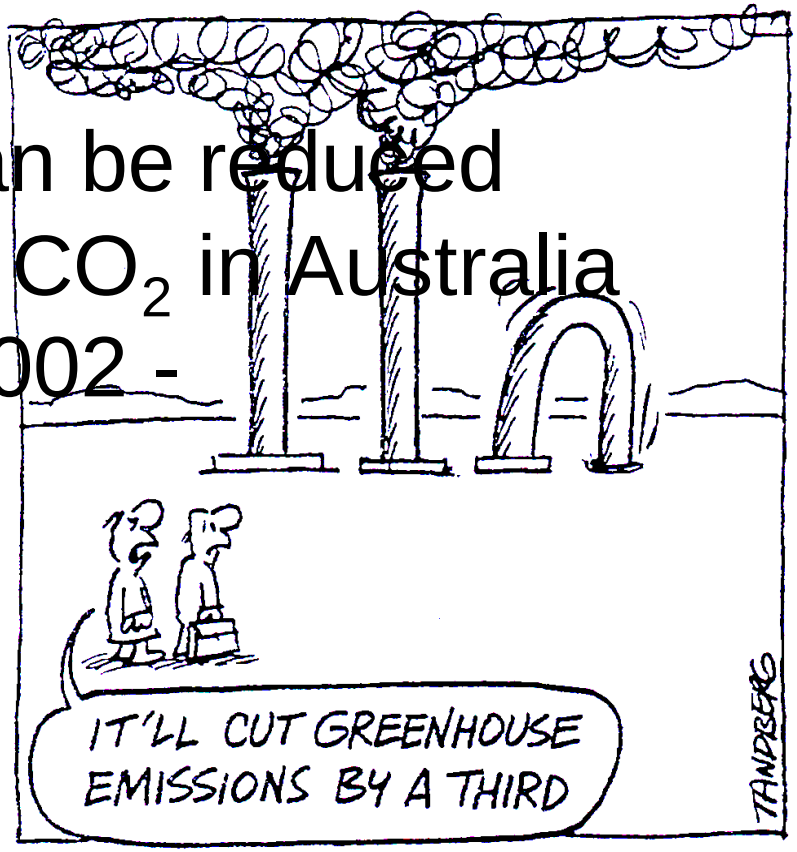
*CSIRO Centre for Low Emission Technology study*[1]

25 % of emissions can be reduced by geological storage of $CO_2$ in Australia - Geodisc 2002 -

90% of respondents rate climate change as an issue vital to Australia's future

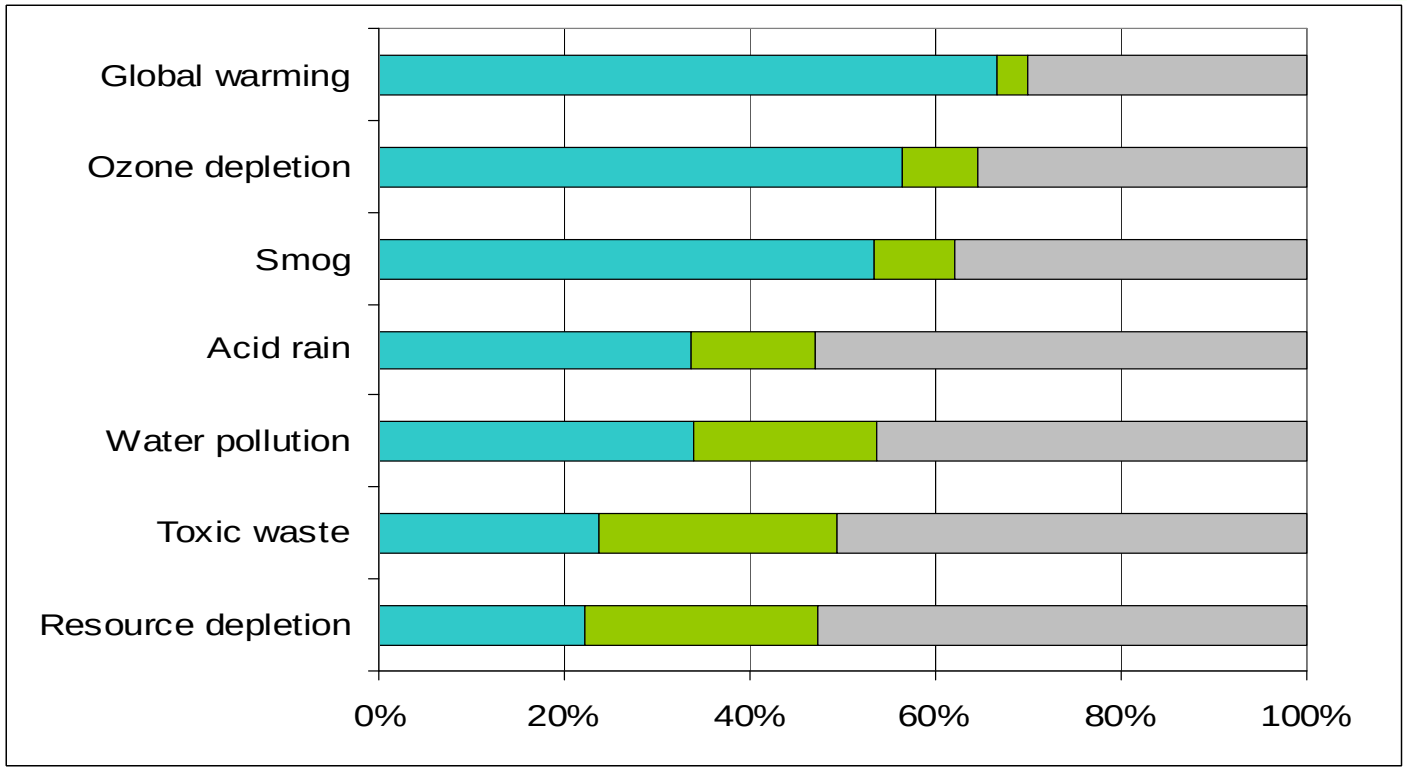
BUT

there is a high level of ignorance about clean coal technologies and CCS




[1]*Ashworth et al., 2006*

# Can CCS reduce these environmental concerns?




Source: Ashworth. P., Reiner, D. Gardner, J. & A. Littleboy (2007) Kyoto or Non Kyoto – people or politics: Results of recent public opinion surveys on energy and climate change (Greenhouse 2007: Sydney)

# Stated Perceived Risks

*from California Environmental Justice Group*

- $CO_2$ liquid's acidic nature is corrosive to the underground environment, contaminating the ground and would eventually leach to the surface.
- When $CO_2$ escapes from underground to the surface it also changes from liquid to gas, it is 1.5 times heavier than air, does not readily disperse in the atmosphere, stays close to the ground and will kill every living human, animal and plant within 20 miles from asphyxiation.
- When $CO_2$ leaches up to the surface it will contaminate underground fresh drinking water aquifers, lakes, rivers and the ocean.

# Stated Perceived Risks

*from California Environmental Justice Group*

- Southern California is in earthquake country with numerous faults. To sequester the volume of $CO_2$ the distance underground will require large dangerous high pressure equipment.
- The $CO_2$ will not be transported by pipelines to a safe location away from the population. The plan is to sequester the $CO_2$ in the Wilmington Oil Field which is located under the City of Los Angeles, City of Long Beach, City of Carson and other neighboring cities.
- Over 500,000 people and children will be placed in danger.

# CCS Risky Business or Not?

- Stakeholder positions about new ideas and technologies are arrived at through a series of decisions that are made when assessing the risks and benefits of a technology, as well as its moral acceptability.
  - ? Important how we communcate our uncertainty ?
- Perceptions of risks are heightened when the risk is
  - unknown, catastrophic, felt immediately, uncontrollable, and can harm other people (Slovic, 2000)
  - In California (previous slides) this is the public perception being presented
- Essential elements of any worthwhile risk communication strategy for new perceived high risk technologies (Cormick 2004):
  - mechanisms for building trust
  - understanding stakeholder perceptions
  - moral acceptability to society
  - ensuring benefits outweigh risks.
  - We need to work on all of these elements

# Where to?

- There is uncertainty in some of the technical processes, and the legal implications
- These uncertainties are different to “normal” subsurface activities
  - Time, volume, interactions
- Effective communication strategy required
  - California example needs to be avoided?
- How we publicly deal with our uncertainty needs careful thought
  - Technical assurance does not equal public acceptance