

CO₂ Sequestration A Scenario for 2020

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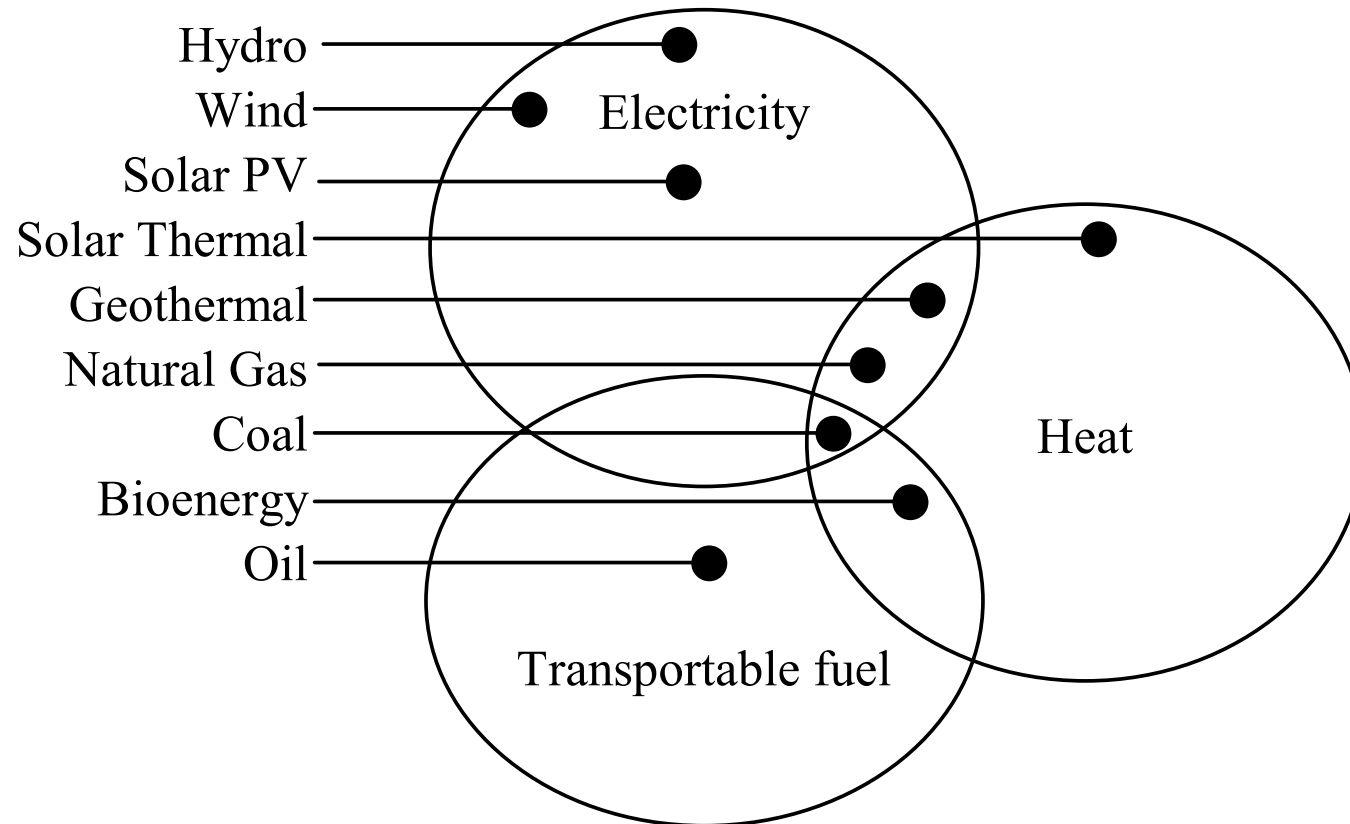
CO₂ Sequestration

- A possible NZ scenario for 2020
- Hydrogen production from coal with CO₂ separation
- CO₂ storage options

Primary Energy Sources to meet NZ energy needs

Primary Energy

Energy Needs



A Sustainable Scenario

If

- Oil imports become scarce or costly
- Gas resources decline
- CO₂ mitigation is imperative

Then

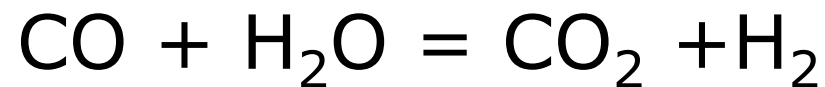
- In addition to use of renewable energy
- Hydrogen production as a transportable fuel made from coal with CO₂ sequestration may be needed

Hydrogen from Coal

Gasification



Shift conversion



Separation and liquefaction of CO₂

CO₂ Separation Technology

- Chemical solvent scrubbing
- Physical solvent scrubbing
- Cryogenic distillation
- Membrane Separation

CO₂ Storage Possibilities

- Unmineable coal seams
 - with displacement of methane
- Depleted hydrocarbon well
 - well characterised CO₂ store
- Deep saline aquifers
 - very large capacity
- Deep ocean disposal ?

Sleipner CO₂ reinjection

- CO₂ is separated from Sleipner gas (9% CO₂) is reinjected into shallower Utsira sub-sea formation
- 5 million tonnes CO₂ has been injected and monitored to date
- Motivation – less expensive than payment of Norwegian carbon tax

Conclusions

- The need to produce transport fuel from coal in NZ is a credible scenario in the long term future
- Hydrogen as an energy transfer medium would facilitate CO₂ sequestration
- Underground CO₂ storage options are established - in principle