Can China's Coal to SNG Effort Be Redirected to Coal to H_2 with CCS?

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PATHWAYS TO CLIMATE SOLUTIONS: ASSESSING ENERGY TECHNOLOGY AND POLICY INNOVATION

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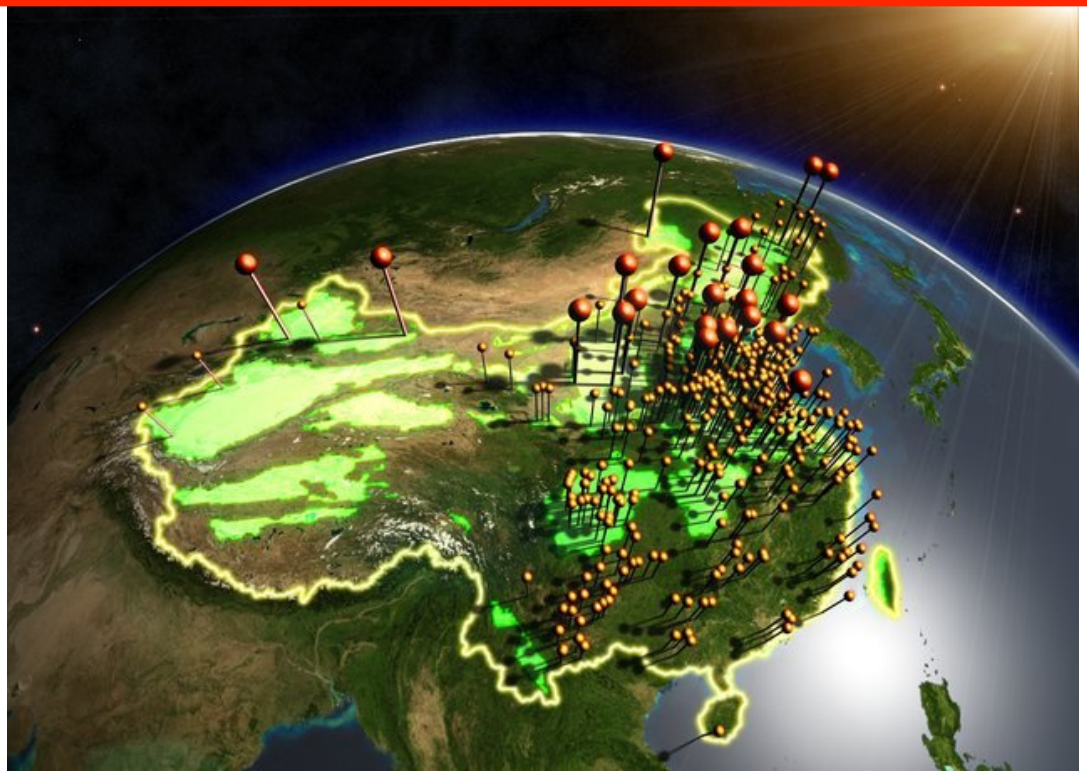
Implications for the World's Climate of China's Rush to Coal-to-SNG to Address $PM_{2.5}$ Air Pollution

- Ongoing rush to make SNG from coal in China aimed at mitigating $PM_{2.5}$ air pollution from burning coal in buildings/industry.
- **Potential disaster for climate**: Yang and Jackson (2013) reports a GHG emission rate ~ 7 X average rate for natural gas:

Approved and Proposed Coal to SNG Projects for China in 2013:		
# of projects	For SNG, annual, according to Yang and Jackson (2013):	
	Production, Quads (10^9 CM)	GHG emissions, Gt CO_{2e}
9 approved by China government	1.4 (37)	0.60
> 40 proposed	Almost 7.4 (almost 200)	Almost 3.2

- But this impending disaster for climate can be avoided:
  - If SNG projects were via energy-efficient SNG plants with CCS:
    - ➔ GHG emissions rate for coal SNG ~ rate for NG
    - Low CO_2 capture costs for SNG ➔ SNG price wouldn't increase much
  - Better, If China could be persuaded to make H_2 instead of SNG with CCS:
    - The GHG emission rate would be reduced to near zero;
    - China already makes H_2 from coal, separating CO_2 (see next slide).

Low-Cost CO_2 Capture Opportunities in China—Most Experience Has Involved Making H_2 from Coal for Making NH_3



Source: Zheng *et al*. (2010).

- Pins: 400 existing & planned chemical plants releasing concentrated CO_2 (low capture costs)
- Green areas: sedimentary basins where suitable storage sites might be found
- 18 "Big Pins": plants within 10 km of deep saline formation emitting > 10^6 t/y CO_2
  ➔ many opportunities for megascale aquifer storage projects with low cost CO_2
- International collaborative CO_2 storage projects? How about CO_2 injection and storage for enhanced water recovery (Aines et al., 2011; Buscheck et al., 2011)?

On the CEDA Proposal of The American Energy Innovation Council's *Catalyzing American Ingenuity: The Role of Government in Energy Innovation (2011)*

A Short review by R.H. Williams

AEIC proposal: Establish Clean Energy Development Administration

- **What is CEDA?** Technology-neutral mechanism to repeatedly finance, build, demonstrate and launch in the market unproven, large-scale energy facilities

- **Principles and Design Features**
  - Independence
  - Private-sector co-investment
  - Strong public- and private-sector expertise
  - Flexibility to offer financing products based on market gaps.
  - Governance and oversight
  - Transparency
  - **Portfolio investment approach**
  - **Self-funded**

Portfolio investment approach

CEDA should strive to create a diversified investment portfolio, focused primarily on clean energy technologies with breakthrough potential. Additionally, the Office of Management and Budget (OMB) and the new institution should jointly develop a methodology to score investments at the portfolio level. This would allow the new institution to operate more nimbly and be evaluated on the overall performance of its investments — in contrast to DOE's Loan Guarantee Program, which is scored on a project-by-project basis.

Self-funded

CEDA should strive to be self funding after an initial public capitalization, meaning that on an ongoing basis it should be funded to the extent possible by financing fees and by returns on profitable investments.

Generating Needed Revenue from within Energy Sector

- **Possible Sources**
  - Redirected Energy Industry Subsidies
  - A "Wires Charge on Electricity (a "public goods charge" of 0.1 cent/kWh = $3.7 billion/year…$1 a month on average residential electric bill)
  - Other Energy Fees
- **Potential:** Energy and emissions fees together have the potential to raise more than $80 billion per year