Richard G. Lugar Center for Renewable Energy
11th Annual Spring Symposium

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Source: Le Quere et al., 2017, *Earth Sys Sci Data Dis*
The Good News— Some Progress Locally and Globally

- Fowler Ridge 600 MW wind farm (#8 in US)
- IND Solar Farm 25 MW (largest at US airport)

Global emissions from fossil fuel and industry: 36.2 ± 2 GtCO₂ in 2016, 62% over 1990
- Projection for 2017: 36.8 ± 2 GtCO₂, 2.0% higher than 2016

Data: CDIAC/GCP/BP/USGS

Projection 2017
- 36.8 Gt CO₂
- ±2.0% (0.8%-3.0%)

2016: 36.2 Gt CO₂

Uncertainty is ±5% for one standard deviation (IPCC “likely” range)
Meanwhile, despite “the decline of coal” in Indiana and the US, coal is a key energy resource in many national plans for future development and economic growth.
Note: US coal exports increased by 61% in 2017
IPCC and IEA have indicated that Carbon Capture and Storage Technologies are likely necessary to meet global warming targets.

*** Not geoengineering by large-scale intervention of the Earth system (e.g., solar radiation management with stratospheric aerosols or iron fertilization of oceans)
Present status of CCUS in the MRCSP region:
Pilot tests completed and 1 Mt injection just finished in 2018

Michigan Basin Geologic Test Site

Cincinnati Arch Geologic Test Site

Appalachian Basin Test Site
Present status in the MGSC Region: IBDP completed 1Mt and ICCS now at 1 Mtpa.
MGSC Illinois project is biofuel with CCS
Potential for negative carbon emissions!
Federal legislation just passed in March provides significant new tax credits for CCS ($35/50 per ton of CO₂).

IL ICCS Project
Ethanol from Corn
Currently 1 million tons of CO₂ capture annually
$208 Million
(USDOE-$141M, ADM-$67M)

Quasar Wabash Project
Ammonia from Coal Syngas
Expect ~ 2 million tons of CO₂ annually
$450 Million (all private)
CCS Technology R&D is moving forward globally, particularly in China

Source: Global CCS Institute, 2016
Geothermal technologies in “low-temperature” regions represent an enormous opportunity.
Steam (red) and condensate (blue) pipes from the CHP

Boreholes with temperature logs

A New Discovery at IUB – *Energy Lost and Found*

Temperature below IUB campus

- Normal
- Geology Bldg
- IGWS Testing Bldg
- Arboretum

Temperature (°C)

Depth (m)
It’s hard to imagine a future WITHOUT combined solar/geothermal/energy storage

Images of Stillwater Plant, Fallon Nevada