Kansas CUSP Activities

Franek Hasiuk, PI for CUSP-Kansas



KGS has been active in CUSP

- Our CCUS History
- Our People
- ONEOK Focused Project
- Outreach
- Data Organization
- Salt, Basalt





KGS CarbonSAFE Phase I and II Projects



Stephone Contraction of the second se

Holubnyak

et al., 2018

Fluid Disposal History in Kansas

- 49 Class I and 2381 Class II Arbuckle wells across Kansas
- Volumes increase in 2005, peak in 2013-2014 to
 >750 million barrels, and drop to 500 million barrel in 2015
- Equivalent of 9M CO₂ tonnes/year for one county





Sources: Kansas Department of Health and Environment, ESRI, USGS, Kansas Corporation Commission, Kansas Geological Survey

Energy Transition Has Key Technologies



CCUS	Energy Storage	Hydrogen Economy	Critical Minerals			
 Gets CO₂ out of the atmosphere Prolongs investments in current infrastructure 	 Manages variable production of power from renewables <i>and</i> fossil generators 	 Can be burned with natural gas Transport fuel 	 Required for high tech manufacturing (e.g., solar panels, wind turbines, electronics, screens) 			
1 Oil/gas is extracted from reservoirs and used 2 CCS technology captures harmful CO2 emissions <u>before</u> they enter the atmosphere	Pump Station Pump	Renewable energies Solar PV Hydroelectric Biomass				
The CO2 is pumped over Soo metres deep underground below the cap rock + CAP BOCK+ CO2 is then safely and permanently stored inside porous rock	Fresh Water Supply Blanket Halite Halite Mtd stone Nud stone	Natural gas Natural gas Coal Fuel cell motiones Fuel cells Fuel cells Fuel cells Fuel cells Processes syntheses Processes syntheses Fuel cells Processes syntheses Commercial Residential Tertiary				

Buildin

Ibukun

Bode-Omoleye

PhD

Sahar Mohammadi PhD	Diana Ortega-Ariza PhD	Jenn Raney MS	Carrie Ridley MS

Petrophysics Geochemistry

Stratigraphy

Outreach

Regulatory

A CUSP Focused Project Midcon CCS Hub

Franek Hasiuk, PI + Project Partners



Analytics: Kansas Case Study





Scenario: Process all capturable emissions.



Scenario: Spatially targeted storage.



Scenario: Process all profitable emissions.



Scenario: Phased infrastructure deployment.

Outreach activities

 Participation in Outreach Working Group

Coordinated outreach filming
NMT, KGS, This Meeting

Presentations at Kansas
 Independent Oil & Gas
 Association, Energy Council





Data Org: Source and Sink Cataloging

Sources							
Site Name	Longitude X (dec deg)	Latitude Y (dec deg)	Source Type	2			
Example - ADM #1	-91.665623	41.97788	Ethanol Plan	t	(
Jeffrey Energy Center	-96.115	39.283	Coal EGU			C	inkc
La Cygne Energy Center	-94.639						
Lawrence Energy Center	-95.269				(
Holcomb Station	-100.973						Sink Sub-Category (Saline,
Nearman Creek	-94.696	Site Name	Longitude X (dec deg)	Latitude Y (dec deg)	Sink Type (Conventional/Unconv	entional)	Stacked Saline, EOR, tight gas, basalt, geothermal, etc)
Hollyfrontier El Dorado Refining LLC	-96.874	Rupp	-101.51400	38.26500	Conventional	-	Stacked Storage: EOR + saline
Coffeyville Resources Nitrogen Fertilizer	-95 605	Hartland-Patterson	-101.45100	38.12100	Conventional	*	Stacked Storage: EOR + saline
cure when he sources will ogen renalizer	07.005	Lakin Bloasant Brairie	-101.28100	37.84900	Conventional	*	Stacked Storage: EOR + saline
CHS McPherson Refinery Inc.	-97.674	Davis Ranch & John Creek	-96.30600	38.88500	Conventional	*	EOR only
Ash Grove Cement Co-Chanute Plant	-95.46	EOR N-Eubank	-101.05200	37.62100	Conventional	-	EOR only
Coffeeville Pesources Pefining & Marketing LLC	LLC -95.606	EOR Shuck	-100.99200	37.21200	Conventional	*	EOR only
coneyvine resources remning & Marketing LLC		EOR Cutter	-101.03700	37.40300	Conventional	*	EOR only
		Witt	-100.29700	38.30700	Conventional	*	Stacked Storage: EOR + saline
		Cunningham	-98.41000	37.69400	Conventional	*	EOR only
		Dexter	-96./1500	37.18800	Conventional		EOR only
		FOR Hall-Gurney	-98 66600	38,80000	Conventional	*	FOR only
		Wellington	-97.43200	37.32200	Conventional	*	EOR only

-100.86100

00 20200

39.10700

20 20100

Conventional

Commentional

Oakley

COD Chau



EOR only

FOD anh

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How do we organize data?





The Exploration Method



Petroleum Systems

Prospectivity

Evaluation

Economic **Evaluation**

Strategy, Unitization

Salt is Key to Energy Storage & Hydrogen





Basalt at 3000 ft under Kansas MGS/IGS Map • Log Porosity is >20% in Igneous Rocks MINNESOTA ND SUPERIOR • Log Porosity up to 7% in Sed Rocks Terra-Patrick #7-22 WI depth (x 1000 feet) Amoco M.G. Eischeid #1 RIOWA в Ν ΝE ۱L (6 km) 20 Iowa Horst ΚA (12 km) 40 Texaco МΟ Poersch #1 (18 km) 60 MRS clastic rocks MRS deep MRS volcanic rocks exploration wells Line of cross-section 🗲 major fault zones

Midcontinent Rift is an uncontested play

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ULTRA HIGH DEFINITION CORE IMAGES

Geoscan V 5,000 pixel linescan camera with

automatic aperture and focus, and dedicated

New KGS Core Scanner!

- Photography
- Color
- Magnetics
- P- and S-wave
- Gamma ray
- Density/Porosity
- Chemistry
- Mineralogy



VNIR and SWIR

spectrum.

transducers.

for chemical analysis.

RGB AND MUNSELL

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CIEOLOGICAL STATESTY OF KANSAS

- Our People
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- Data Organization
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- New Instrumentation



The Exploration Pyramid





DIGITUS: Digital Twin for US Strata

- Speed process from basin- to prospect analysis
- Support rigorous, probabilistic resource assessment to support investment decisions
- Support well permitting process to reduce time-to-permit
- Preserve fundamental role of Surveys in jurisdictional expertise and data stewardship
- Leverage Enverus services and unique stratigraphic interpretations

