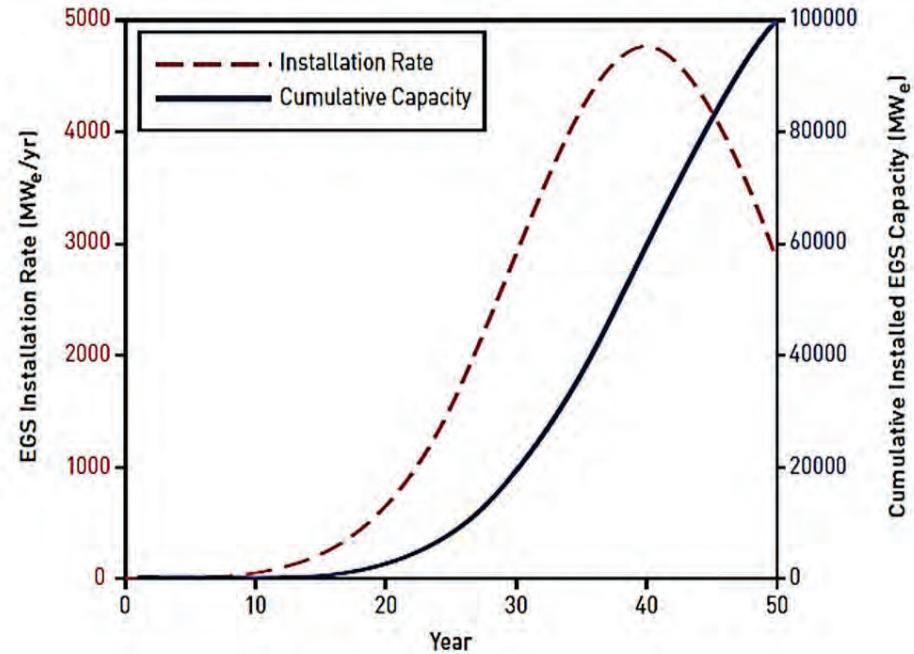


The Future of Geothermal Energy

Impact of Enhanced Geothermal Systems (EGS) on the United States in the 21st Century



SMU | ROY M. HUFFINGTON
DEPARTMENT OF EARTH SCIENCES



NPR #3
U.S. DEPT. OF ENERGY
75-TPX-10
2469' FSL, 1383' FEL
ELEV. 5188' G.L.
SEC. 10, T 38 N, R 78 W

U.S. DEPT. OF ENERGY
NPR #3
75-TPX-10
2469' FSL, 1383' FEL
ELEV. 5188' G.L.
SEC. 10, T 38 N, R 78 W

Tea Pot Dome, Wyoming

FORGE (egs)



IDAHO NATIONAL LABORATORY

Location: Snake River Plain, Idaho

SANDIA NATIONAL LABORATORIES

Location: Fallon, Nevada

UNIVERSITY OF UTAH

Location: Milford City, Utah

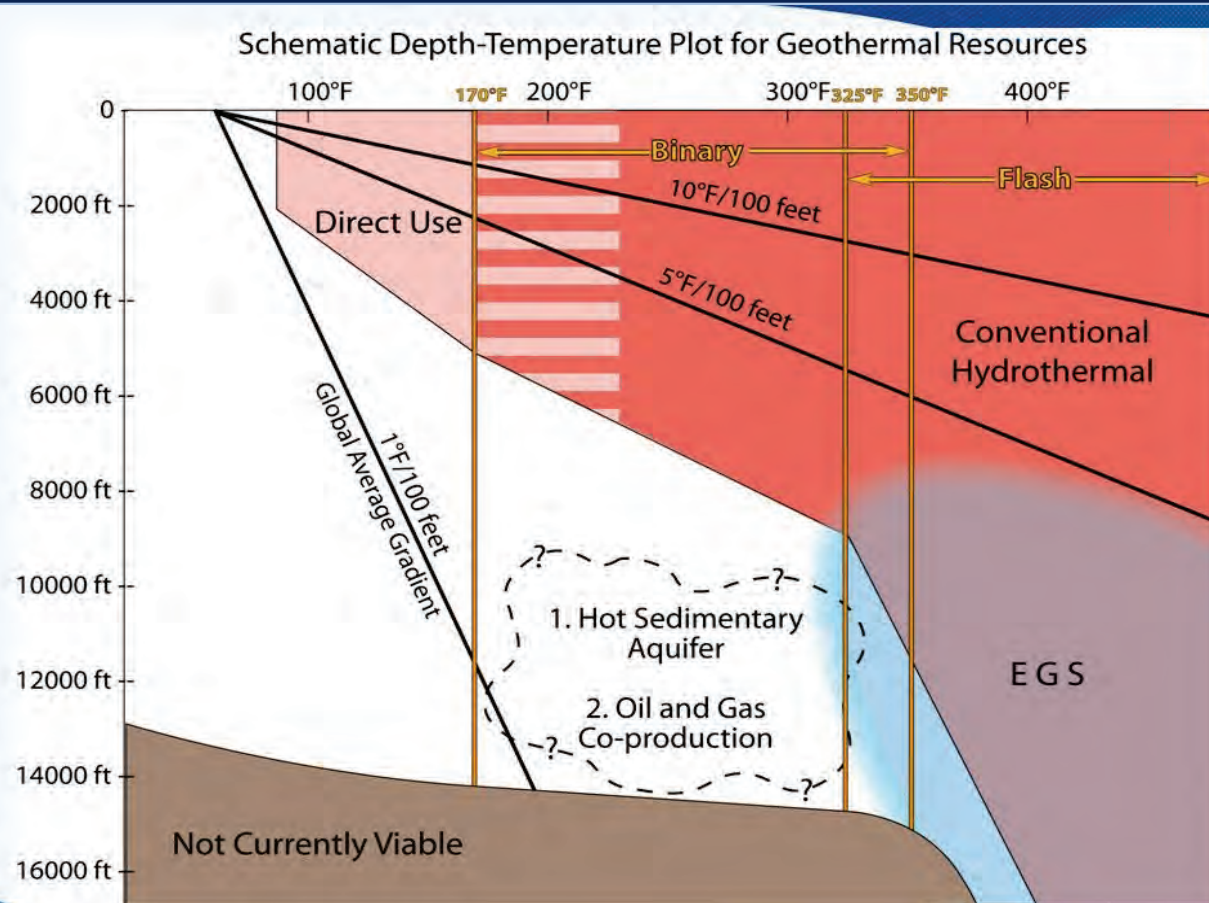
SANDIA NATIONAL LABORATORIES

Location: Coso, California

PACIFIC NORTHWEST NATIONAL LABORATORY

Location: Newberry Volcano, Oregon

Geothermal Energy Categories

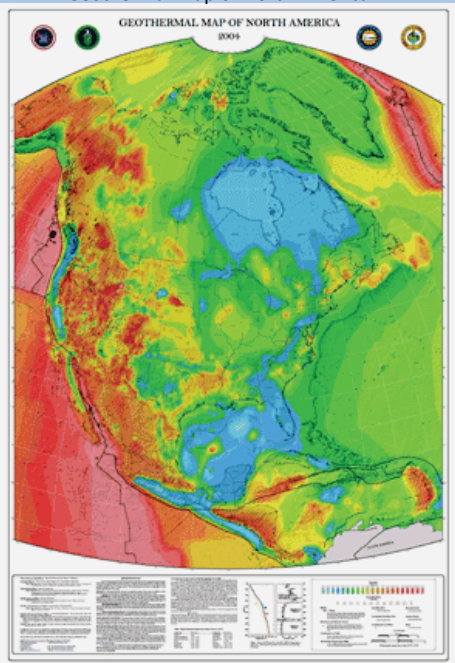


Electricity

- Binary Fluids (195-300°F)
 - Coproduction
- Hydrothermal > 300°F
- EGS > 300°F
 - Sedimentary Basin
 - Hot Dry Rock
 - largest projects
- Geopressured

Paul Brophy, DOE Webinar, 2012





Timeline of Geothermal - Oil & Gas Focus

1975 Texas Geothermal Resources Act written

1989 First Geopressure power plant in the US, Brazoria County, TX

2004 SMU completes Geothermal Map of North America

2005 UTC builds prototype of PureCycle® (now under PWPS)

2005 Steve Bergman with SMU "discover" RMOTC's high fluid flow

2006 *Chena Hot Springs, Alaska* develops geothermal power (500 kw)

2006 1st SMU Geothermal Conference on Utilizing Oil & Gas Fields

2008 ORMAT Technology installs binary unit at Rocky Mtn Oilfield Testing Center, WY

2008 ElectraTherm, Inc. demonstrates Green Machine on SMU Campus in Dallas, Texas

2009 Texas H.B. 4433 Hydrocarbon Tax Exemption from Severance Oil/Gas Tax for Geothermal Wells

2009 RPSEA.org awards project to Gulf Coast Green Energy and Denbury Resource in central MS

2009 DOE Geothermal Technologies program funds projects in ND, TX, LA

2010 Oregon Institute of Tech. powers-up with PWPS PureCycle®

2010 DOE Geothermal Low-Temperature "Road Mapping" plan established

2011 North Dakota research project compares all current binary technologies for oil field settings and presents at SMU Geothermal Conference in June.

2012 New National Geothermal Database System includes all of Texas RRC O/G data for geothermal projects.



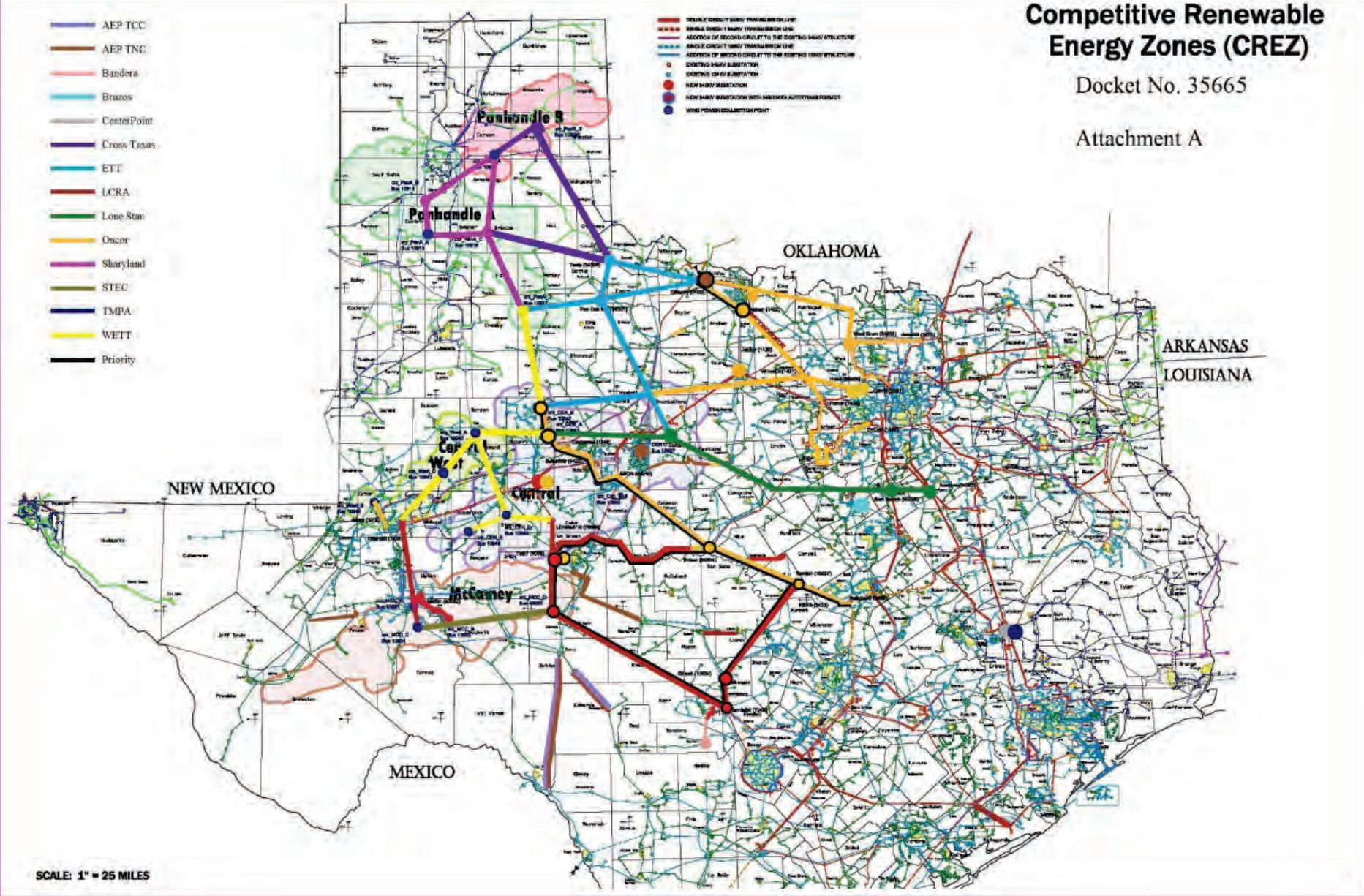
Competitive Renewable Energy Zones (CREZ)

Docket No. 35665

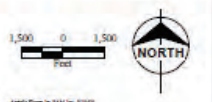
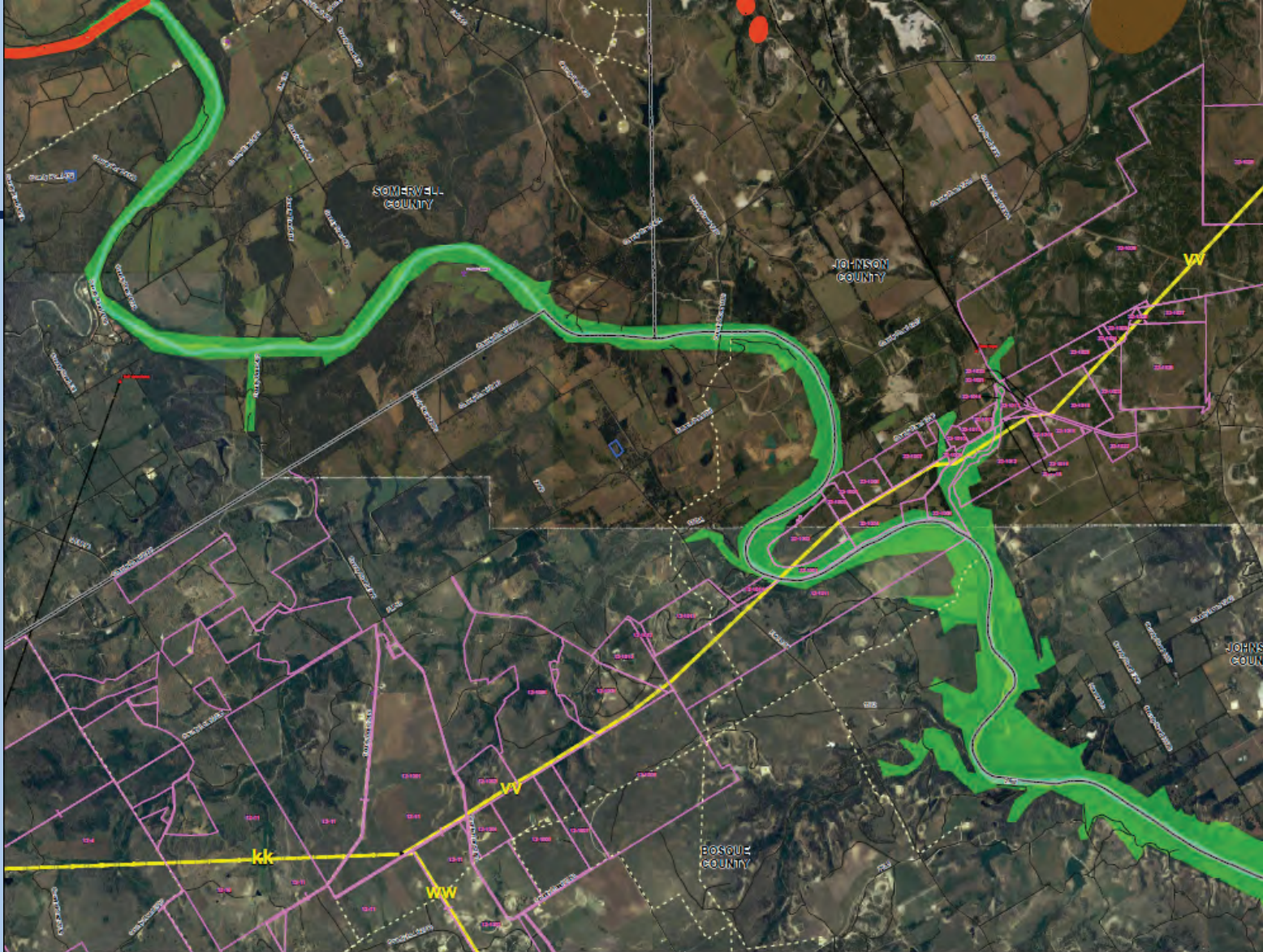
Attachment A

- AEP TCC
- AEP TNG
- Bandera
- Brazos
- CenterPoint
- Cross Texas
- ETT
- LCRA
- Lone Star
- Oncor
- Sharyland
- STEC
- TMAPA
- WETT
- Priority

- DOUBLE CIRCUIT BARRY TRANSMISSION LINE
- SINGLE CIRCUIT BARRY TRANSMISSION LINE
- ADDITION OF BARRON CIRCULAR TO THE EXISTING BARRY STRUCTURE
- SINGLE CIRCUIT BARRY TRANSMISSION LINE
- ADDITION OF BARRON CIRCULAR TO THE EXISTING BARRY STRUCTURE
- EXISTING BARRY SUBSTATION
- EXISTING BARRY SUBSTATION
- NEW BARRY SUBSTATION
- NEW BARRY SUBSTATION WITH 140/138KV AUTOTRANSFORMER
- WIND POWER COLLECTION POINT



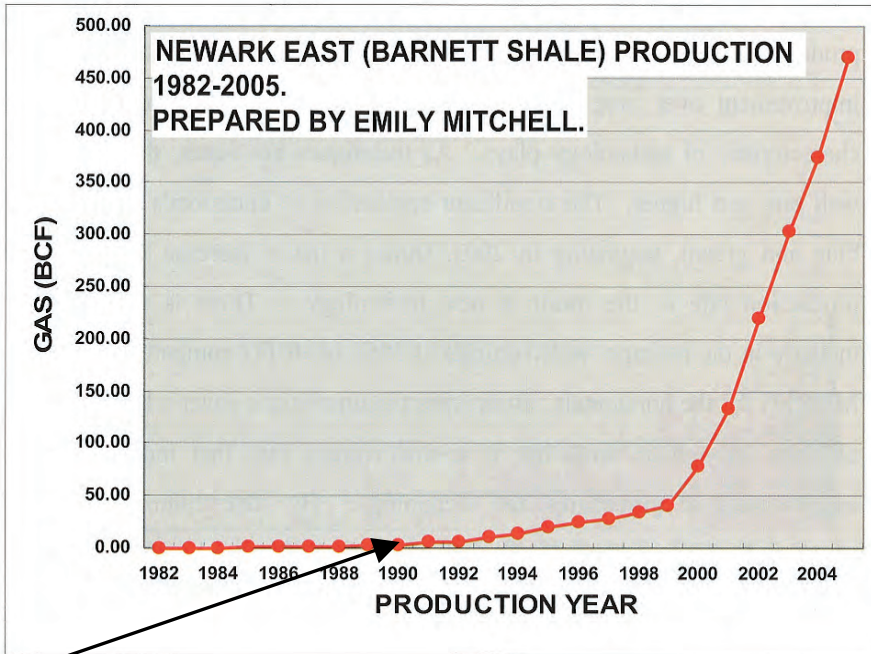
SCALE: 1" = 25 MILES



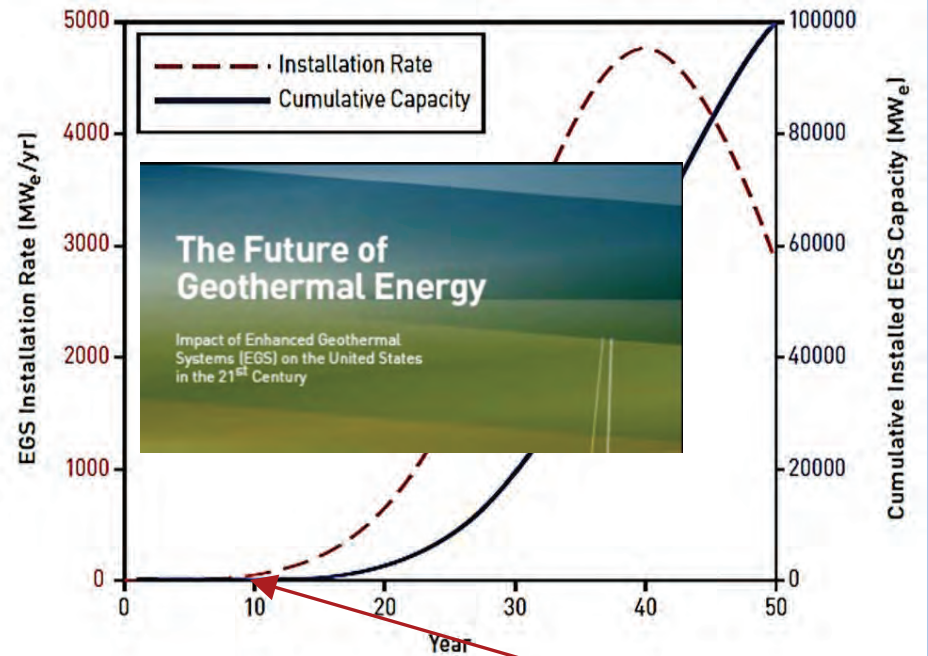
LEGEND		Parks/Recreational Areas		Government Owned Lands		Structures		Oil and Gas Pipelines		Environmentally Sensitive Areas	
Study Area Boundary	8kV	Federal	Federal	Federal	Air Strip	< 10" Diameter	Wind Farm	National Register Historic Site	10" - 20" Diameter	Other	State/Federal T&E Species
Proposed Substation	115kV	State	State	State	Cemetery	> 20" Diameter	Golf Course	Communication Tower	15" - 20" Diameter	Municipal Boundary	Federal Candidate
Segment End Point	138kV	County	County	County	Church	15" - 20" Diameter	County Boundary	Water Well	> 20" Diameter	County Boundary	
Preliminary Routes	230kV	City/Municipal	City/Municipal	City/Municipal	Irrigation System	Oil/Gas Well		Oil/Gas Well			
Link Identifier	345kV				Existing Substation						



Extending the life of an oil/gas fields



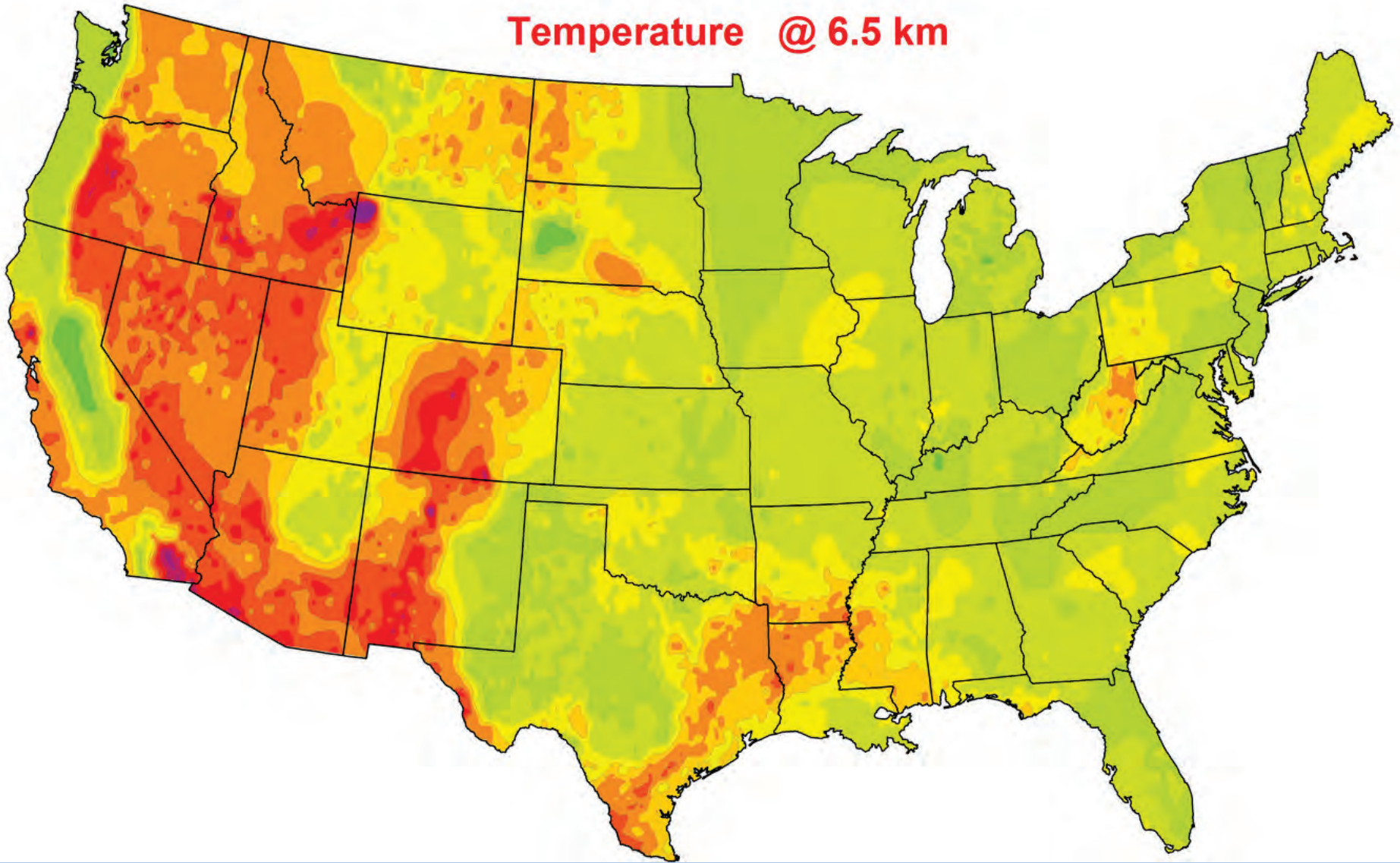
Based on the shale plays



Geothermal development in O/G fields is right on target!

Currently experimental in US, Australia, Germany, & UK

Temperature @ 6.5 km



The Future is UP *to* YOU!



SMU | GEOTHERMAL
LABORATORY