



# Building Out New Mexico's Geothermal Potential

*Fourth Meeting of the Science, Technology, and  
Telecommunications Committee*

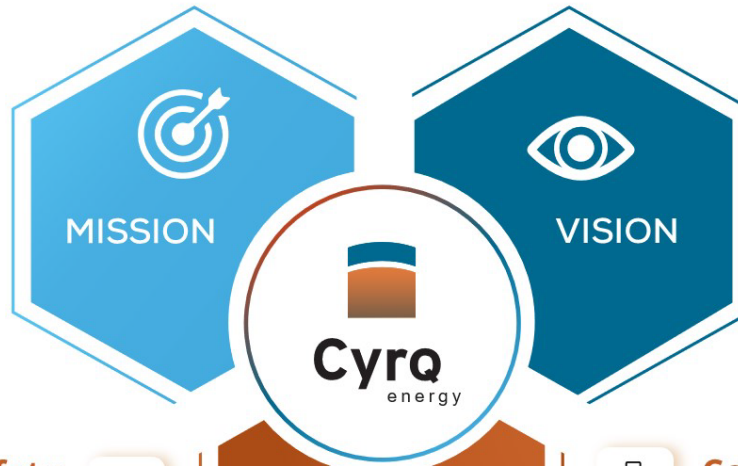
*WNMU, Silver City, NM*

*September 21, 2023*



# MISSION VISION VALUES

We harness the heat of the earth to create clean energy while pursuing the highest standards of health, safety, and sustainability.



We believe in a future fueled by renewable energy and are driving the transition towards that vision.

**Safety**  
Ensuring everyone goes home the way they arrived



**Respect**  
For each other and the planet



**Collaboration**  
Through teamwork across geographies and functions



**Results-orientation**  
Being resourceful, rigorous and responsive



**Personal Accountability**  
A sense of urgency and desire to learn from mistakes



# Introduction to Geothermal Power Generation

Loose Parts by Dave Blazek for July 25, 2023

Whatever you do, don't get him started on the benefits of geothermal energy.

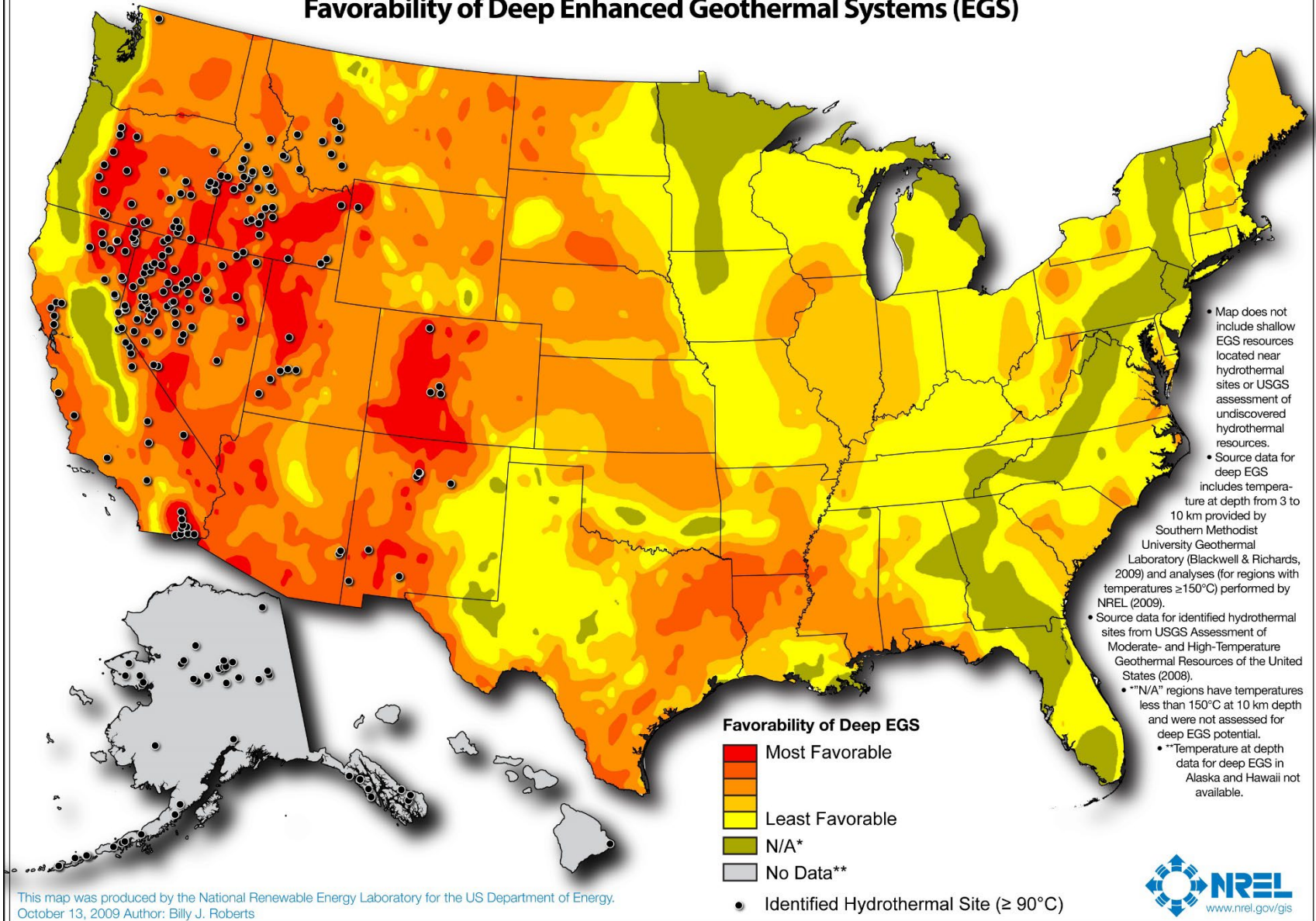


Blazek

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# Geothermal Resources in the US

## Geothermal Resource of the United States Locations of Identified Hydrothermal Sites and Favorability of Deep Enhanced Geothermal Systems (EGS)

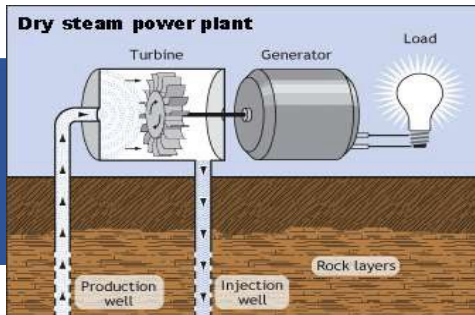


# Three Types of Geothermal Plants

There are several ways to make geothermal power, depending on the resource.

## DIRECT STEAM

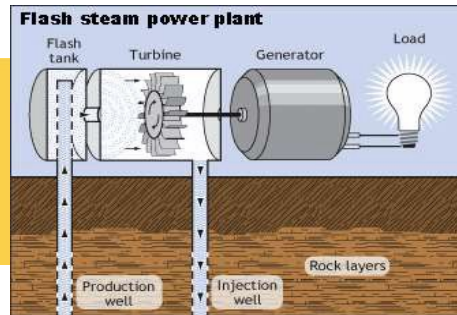
Dry steam to run electric turbines.



Lassen, Lake,  
Sonoma

## FLASH STEAM

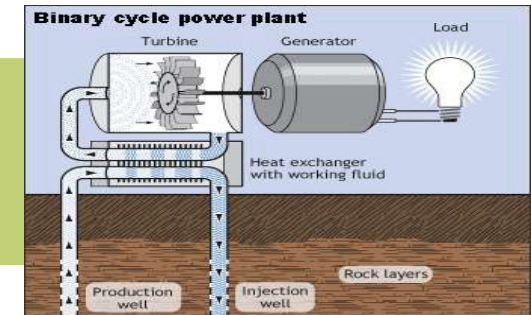
High temp thermal fluids (360°F+) "flashed" into steam.



Salton Sea  
Region

## BINARY CYCLE

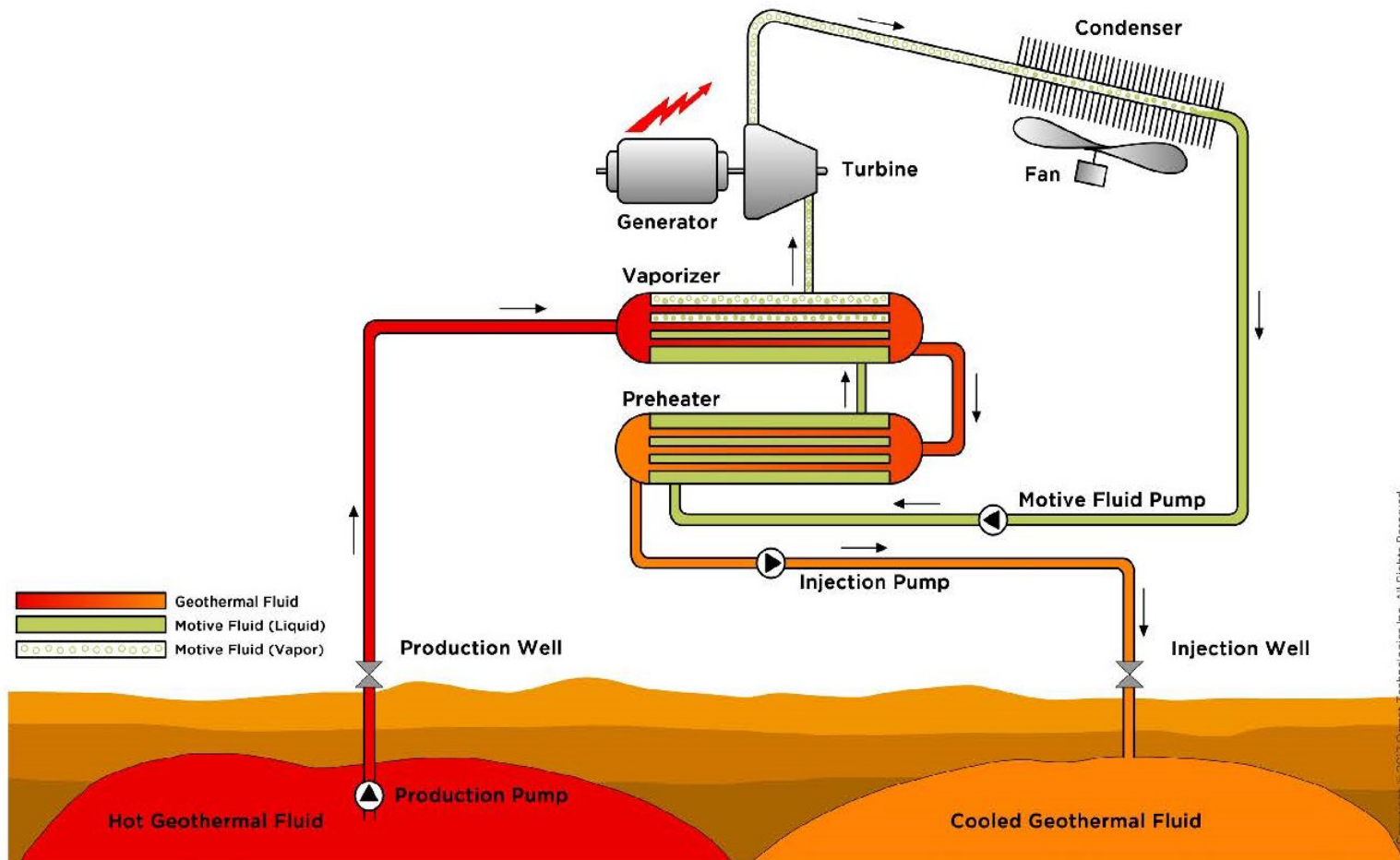
Low temp thermal fluids + binary working fluid make steam.



Sierra Nevada &  
Nevada

# How Does A Geothermal Plant Work

## AIR-COOLED BINARY GEOTHERMAL POWER PLANT



# The Footprint of a Geothermal Plant

Acre-for-acre geothermal plants have little effect on other important land uses, like agriculture and outdoor sports.

## LAND USE

ACRES PER GIGAWATT CAPACITY

- SOLAR PV
- SOLAR CONCENTRATING
- WIND
- COAL
- GEOTHERMAL**





# Geothermal Power: Capacity Factor

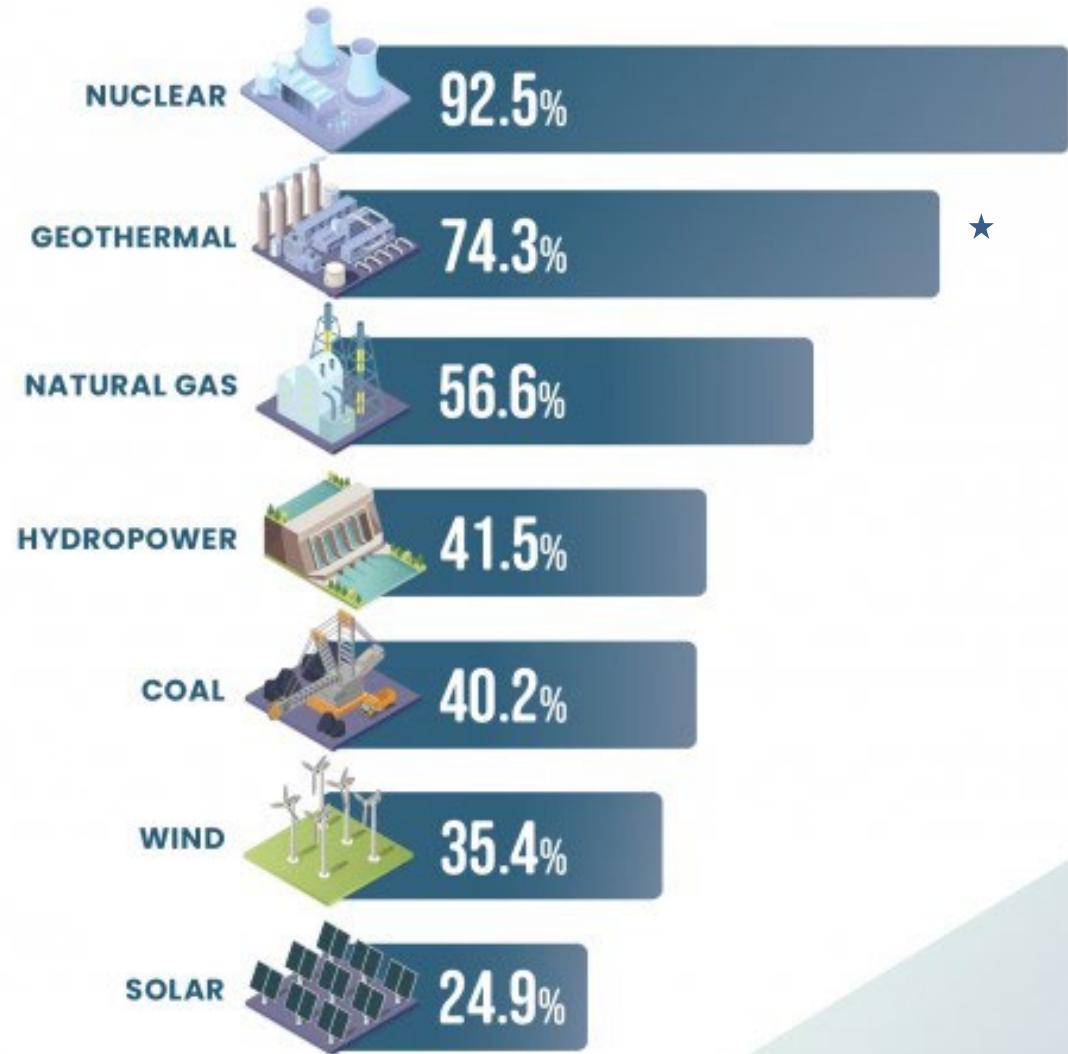
## Capacity Factor by Energy Source in 2020

Source: U.S. Energy Information Administration



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
NUCLEAR ENERGY



★ Cyrq's binary fleet has average availability of 98%, and capacity factor of 92%



# Introduction to Cym Energy



Cyrq's operating plants total ~200MW of gross generating capacity.

With six operating plants across the west, and a development portfolio of an additional 300MW, Cyrq is the 4th largest geothermal company in the US.

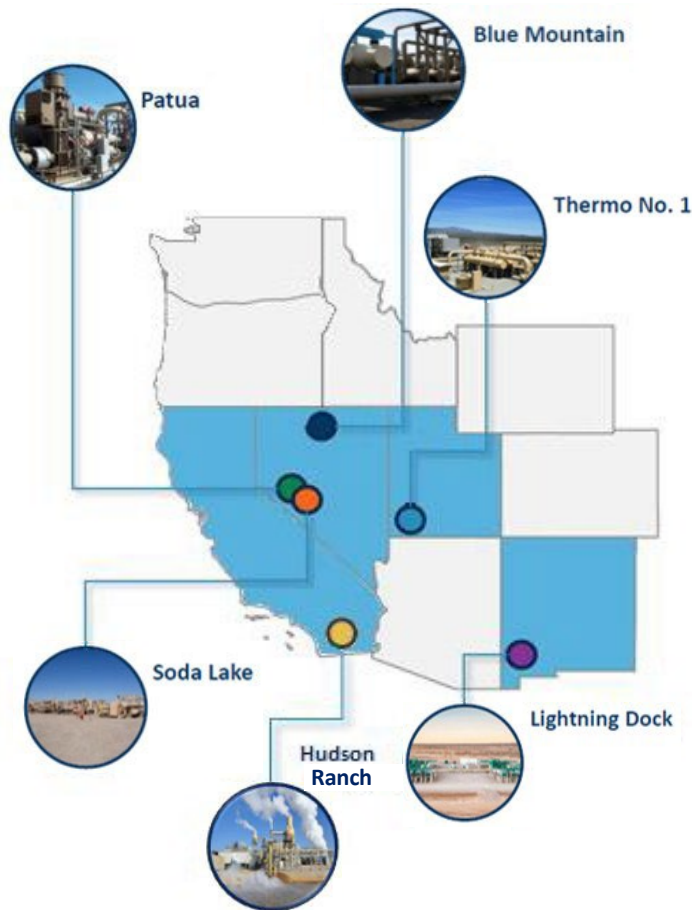


NAD 1983 UTM Zone 11N  
July 25, 2019 1:12,000,000 0 115 230 460 Miles

# Cyrq's Operating Portfolio

Contracted geothermal renewable energy portfolio with stable operational history and long-term, fixed price PPAs.

## Portfolio Overview



## Asset Overview

Asset	Capacity (net MW)	COD / Repower	Offtaker	Location
Hudson Ranch	55	2012	Salt River Project	Salton Sea, CA
Thermo No. 1	13	2009 / 2013	City of Anaheim	Beaver County, UT
Soda Lake	24	1987 / 2019	University of Utah (Rocky Mountain Power)	Fallon, NV
Patua	40 (incl. 10 solar)	2013	SMUD	Hazen, NV
Blue Mountain	40	2009	NV Energy	Winnemucca, NV
Lightning Dock	10	2013 / 2018	PNM	Animas, NM
<b>Total</b>	<b>186</b>			



# Building Out New Mexico's Geothermal Potential



# Geothermal in New Mexico

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Critical issues to be addressed in order to grow geothermal development in New Mexico

- 1 Transmission — Geothermal resources are often located in remote regions. Access to transmission, including interconnections, is critical.
- 2 Leases — Geothermal development relies on access to geothermal resources, often owned by the State and Federal Government. More lease auctions are needed.
- 3 Market Dynamics — baseload and flexible renewables will be needed for a sustainable grid. Over time, resources like geothermal will be needed, even at higher price, to ensure grid stability and capacity availability.



# Geothermal in New Mexico: How Can the State Best Support Development?

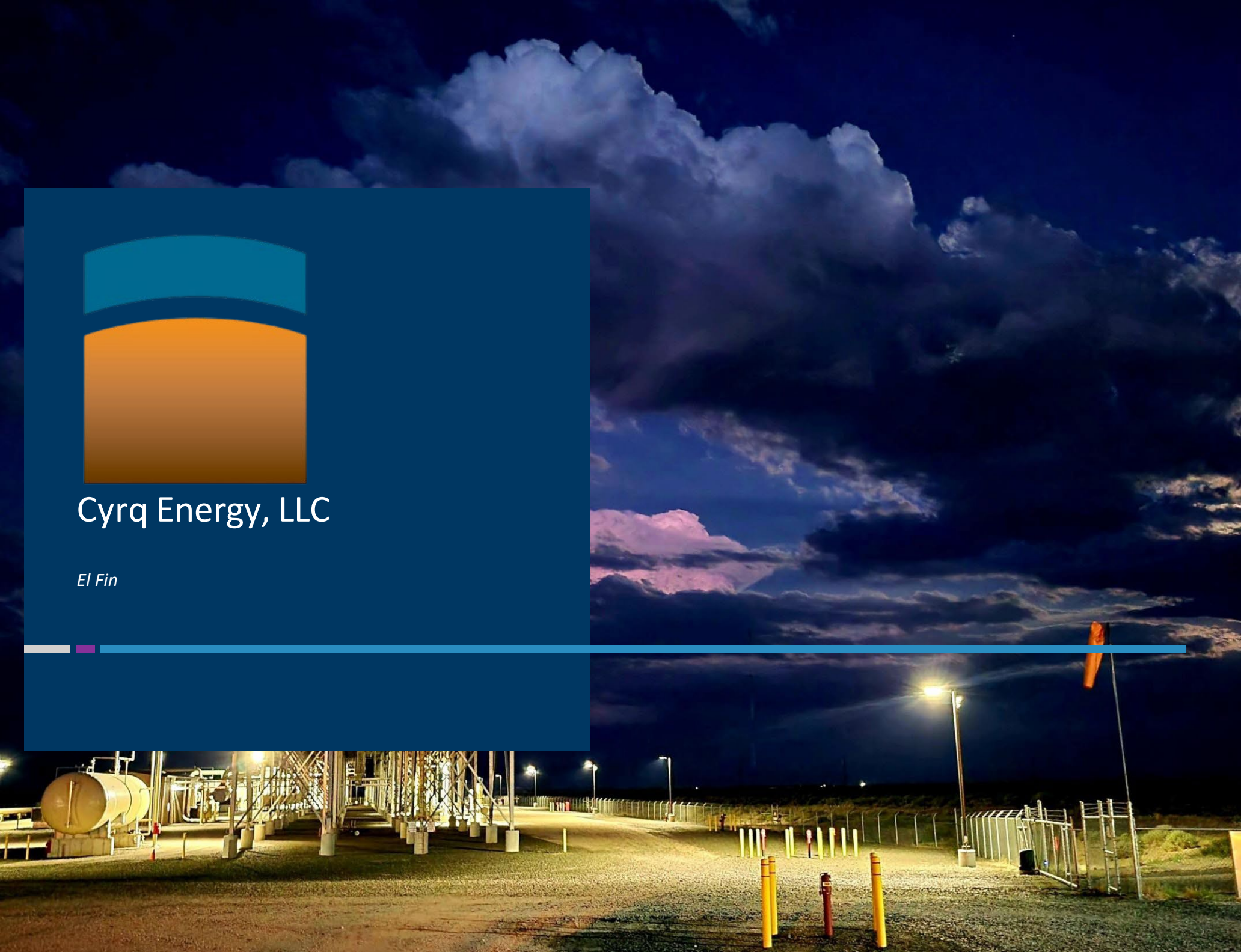
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- Transmission and Interconnection.
  - Support RETA and other programs to expand transmission
  - Ensure proposed projects have access to reasonable interconnections
  - Support construction of interconnections required to bring these projects onto the grid
  
- Access to Geothermal Resources.
  - Encourage the State Land Office to conduct geothermal leases
  - Ensure the Federal Government (BLM) is focused on lease auctions
  
- Market Dynamics.
  - Avoid the California experience of over developing solar.
  - Ensure New Mexico has access to a diverse portfolio of renewable generation, including low cost intermittent renewables, baseload and flexible renewables and storage (short and long term).



Cyrq Energy, LLC

*El Fin*







## Appendix: Cyrq Portfolio of Plants

## Soda Lake



Soda Lake 3 is a 24 MW geothermal generation facility located in Churchill County, NV. Soda Lake 3 was constructed in 2018-2019 and brought online November 2019. Soda Lake 3 was built to replace the Soda Lake 1 and 2 units. Soda Lake 3 consists of one ORMAT energy converter (“OEC”) unit.

Soda Lake is contracted with the University of Utah through 2044 to provide for the sale of its generated electricity. Electricity is provided using Cyrq’s 7.2-mile 69kV transmission line running from the facility to the Ragtown substation located in Churchill County, NV.



Patua Geothermal & Solar is a nominal 40 MW facility located in Churchill and Lyon Counties, NV consisting of a 30 MW geothermal plant and a 10 MW solar facility. Patua Geothermal commenced operation in 2013. Two of the three units at Patua were equipped with a Hybrid Cooling solution in 2019. The units run air cooled in the colder months and the plant switches to two-unit water cooled operation in the summer months. The photovoltaic solar plant was added in 2017. The power plant consists of three power units. The solar plant consists of 45,360 photovoltaic panels, rated for 300 watts each, separated into seven zones, which feed sixteen inverters.



The electric power produced by Patua is routed from the generator step-up transformer to Nevada Power over Cyrq's 8.3-mile 120kV line connecting Patua to the Eagle Substation located in Lander County, NV.

Patua is contracted with the Sacramento Municipal Utility District through 2033 to provide for the sale of its generated electricity up to 19 MW. The remaining generation is sold to UAMPS and is contracted through 2033.

## Blue Mountain



Blue Mountain is a 40 MW geothermal generation facility located in Humboldt County, NV. Blue Mountain consists of three ORMAT energy converter (“OEC”) units and was constructed in 2009

Blue Mountain is contracted with NV Energy through 2029 to provide for the sale of its generated electricity. There is a single 20.5-mile 120kV transmission line owned by Cyrq from the plant to the grid connection at NV Energy’s Dunn Glen substation in Mill City, Nevada.

## Lightning Dock



This geothermal facility was originally constructed in 2013 as a 4 MW generation facility using four Kaishan Organic Rankine Cycle (“ORC”) expanders. In 2019, the facility was repowered to a 14 MW facility through a partnership with Mitsubishi Turboden utilizing one ORC unit. The facility is located on 10 acres in Hidalgo County near Animas, New Mexico.

Its capacity is sold under a PPA to the Public Service Company of New Mexico (“PNM”) through 2042. Generation is delivered using a 17-mile transmission line owned by the local cooperative which runs from Cyrq’s facility to the Playas Substation located in Hidalgo County, NM.

## Hudson Ranch



Located approximately 6.5 miles from Calipatria, California, and close to the Salton Sea shoreline, Hudson Ranch came online in 2012 capable of generating 55 MW of electricity. The facility contains one Fuji Electric supplied steam turbine, one Fuji Electric air-cooled generator, a Delta Star step-up transformer, a brine processing facility, and a cooling tower. Its power supplies the Salt River Project, a power and irrigation district in Tempe, Arizona and is contracted through 2042.

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