To: UAMPS Resource Project Participants in the Geothermal Study Project

From: Matt Hastings, Managing Director of Resources

Date: August 31, 2023

RE: Summary of Geothermal RFP

Introduction

During 2022, UAMPS Resource Project participants expressed an interest in pursuing geothermal resources, both from a power purchase and owned-operated resource perspective. After reaching out to various geothermal resource developers, the Resource Project was provided with an early look at what to expect from a geothermal resource. The Resource Project participants recommended that a Request for Proposals (RFP) be issued to cast a wider net on possible opportunities as well as identify competitive pricing. Power Engineers was engaged to support preparing the geothermal RFP and its responses.

Development of RFP

The following excerpts from the RFP identified expectations in the RFP:

Timing

- Terms for the power purchase agreement (PPA) are expected to be either 20 or 25 years and are preferred over shorter-term lengths.

- Electrical power deliveries are expected to commence on or before March 1, 2028. However, UAMPS is aware that in some cases this timeframe may not adequately allow for the full development of a greenfield geothermal power plant. UAMPS is willing to review proposals in which the required COD might not be met but offers a reasonable development schedule that clearly defines the pathway to an acceptable COD with applicable milestone guarantees.

Location and Interconnection

- UAMPS is willing to explore projects which interconnect with the PacifiCorp East (PACE) control area or the NV Energy (NVE) control area. UAMPS will further consider projects that can reasonably and economically deliver power to UAMPS' member communities if not within those two control areas. Bidders should demonstrate that the proposal project has a

generation interconnection with transmission availability to move the generation to UAMPS customer loads. Network transmission service is the preferred solution.

Respondents – bidders

The RFP was directly submitted to ten entities that Power Engineers recommended. Respondents to the RFP included Enel, Fervo, GeoX, Union Corp, and Cyrq. Respondents have varying levels of experience.

Enel is the most experienced with over 56 GW of renewable installed capacity. In the USA, Enel currently has 64 plants in operation or under construction producing wind, solar and geothermal energy, for a total installed capacity of 9.6 GW in 14 States, among which 3 geothermal power plants in Stillwater 33.1 MW (Nevada), Salt Wells 13.4 MW (Nevada) and Cove Fort 25 MW (Utah) for a total of 72 MW.

Cyrq is next in order of experience. Cyrq is the owner and operator of six geothermal power plants: Three in Nevada, one in New Mexico, one in Utah, and one in California. Five of the plants use binary or organic Rankine cycle (ORC) technology and one is a flash steam plant. One of the plants in Nevada is a hybrid geothermal solar plant with the PV generation offsetting the drop off in generation due to increased parasitic load from the geothermal plant's increased auxiliary fan loads during increasingly hot summer periods.

Fervo projects were presented to the Project Management Committee last year. Based upon their bid information, Fervo Energy is the largest holder of geothermal acreage in the world, with a portfolio of over 450,000 acres of federal, state, and private lands in five different states. This acreage could support up to 1 GW of geothermal development by 2030 and over 1 GW per year of new installed capacity from 2030 onward. Fervo currently has three projects in development in the western United States totaling 103 MW.

GeoX does not have any currently operating projects but does have several in various stages of planning. Their technology is focused on Engineered Geothermal Systems (EGS) utilizing advanced technology which generates from lower temperature wells.

Union Corp is a new company that was founded by oil and gas industry experts. Union Corp is partnering with Ormat to develop a project in Nevada.

Evaluation

Bidders were scored against a series of criteria. The table below identifies the weighting for each criteria used. Recent UAMPS experience has demonstrated that there are significant impacts in the selection of counterparties for future power purchase agreements (PPA). Simply signing a PPA with a competitive price cannot be the only consideration when identifying the appropriate counterparty. The experience of the counterparty and that of its principal employees has a direct bearing on the ability of the project to come to fruition. All of the bid projects have a significant time delay before commercial operation date. A plausible scenario could be members anticipating a base load resource for five years at an acceptable price and then a significant delay or project cancelation creates an urgent requirement to replace the base load power with a market purchase. In the five years between contract execution and COD, the market pricing could be significantly more expensive. The grading criteria is critical to ensure that all points are optimized for the best possible result.

Evaluation Criteria	Weight
a) Evaluated Price and Price Breakdown	27%
b) Project Schedule	22%
c) Conformance to the Details of the RFP Requirements	5%
d) Project Staff (New Project PPA and BTA Agreement)	10%
e) Project Team (Subcontracting Plan)	10%
f) Project Technology	9%
g) Geothermal Experience	10%
GRAND TOTAL SCORE:	100%

Table 1. Evaluation Criteria

In the criteria above, the project schedule—b) is almost as important as the weighting of the price and price breakdown of the purchase—a). If the bidder had a schedule that enabled the project to achieve commercial operation date sooner, it received a higher score. Bids were also graded for reasonability. If a bidder's schedule was logical, this was taken into account. If a schedule was overly optimistic based upon information provided, and not deemed achievable, it was scored lower. Also significant is the experience of the project team—d) and the maturity of the technology itself—f).

The defining difference in the bid comparison is really based in the evaluated price and the project schedule, which wraps into the bidder's personnel and company experience with previous projects.

The following table identifies the evaluation that Power Engineers completed for the RFP bidders. The evaluation on Cyrq was separate and completed by UAMPS staff as a result of Cyrq's late bid submission.

Evaluation Criteria	Weight	Max Rating	ENEL		Fervo		GeoX		Union Corp		Cyrq	
			Rating	Score	Rating	Score	Rating	Score	Rating	Score	Rating	Score
a) Evaluated Price and Price Breakdown	27%	100	30	8.10	40	10.80	45	12.15	50	13.50	55	14.85
b) Project Schedule	22%	100	90	19.80	80	17.60	80	17.60	70	15.40	90	19.80
c) Conformance to the Details of the RFP Requirements	5%	100	87	4.33	87	4.33	80	4.00	87	4.33	50	2.50
d) Project Staff (New Project PPA and BTA Agreement)	10%	100	76	7.60	64	6.40	44	4.40	44	4.40	70	7.00
e) Project Team (Subcontracting Plan)	10%	100	57	5.67	63	6.33	57	5.67	50	5.00	60	6.00
f) Project Technology	9%	100	72	6.48	72	6.48	56	5.04	66	5.94	72	6.48
g) Geothermal Experience	10%	100	92	9.20	88	8.80	68	6.80	64	6.40	90	9.00
GRAND TOTAL SCORE:	100%			61.18		60.75		55.66		54.97		65.63

Table 2. Bidder Evaluation

Enel has significant experience with over 9.6 GW of renewable installed capacity. It has three geothermal plants in operation in the United States including two in Nevada and one in Utah. Enel identified many geothermal plants that is has operated during the last 15 years. It detailed its center for excellence, drilling team, engineering unit, and operations and maintenance business units and the functions of each. Enel conformed to the RFP requirements and appeared to have the staff and project

team available to execute on the project. Site control has been achieved. Enel has not yet entered the generation interconnection queue. The location and number of well sites necessary to meet plant capacity requirements was described. Conventional binary technology will be utilized. Permitting requirements and scheduling detail were provided. Based upon the details provided, Enel would have been the top choice if not for the LCOE.

Fervo was founded in 2017 and has two current projects. The first is a 10 MW project where Fervo is drilling for production increase. The second is a 40 MW project that expects COD in 2026. While Fervo is a newer company, it identifies several key leadership individuals that have significant industry experience. The conformed RFP submission indicates a smaller company with sufficient capability to execute the proposed project. It has complete site control through Bureau of Land Management (BLM) leases. The project has requested an interconnection with PacifiCorp, has had system impact study and facility studies completed and anticipates executing on the interconnection agreement in June 2024. Fervo detailed the permitting requirements and associated schedules. It plans to have horizontal well design utilizing binary technology above ground. Fervo will utilize Turboden technology with Power Engineers providing engineering assistance. The interconnection work by Fervo provides comfort in its ability to adhere to its schedule. While a newer company, Fervo appears to be a strong candidate for a long term PPA. However, the LCOE is comparatively expensive.

GeoX was founded in 2021, and its staff has experience in many geothermal projects around the world. It currently has 16 projects in its pipeline for development. The conformed RFP submission indicates a smaller company with advanced technology and academic rigor. GeoX has over 8,000 acres under geothermal leases and exploration agreement near Beryl, Utah. It is currently negotiating lease from private owners near Newcastle, Utah. Significant research was conducted to understand site characterization based upon previous geological work. GeoX identifies themselves as the only company that has the technology to construct horizontal heat exchangers. Pre-feasibility interconnection and generator deliverability analysis has been completed for one of the proposed sites and additional analysis will be completed later for the second site. Binary geothermal generation will be utilized. GeoX has significant academic expertise. A lack of transmission interconnection development and currently operating plants decreases the outlook for success for bringing a new project online. The higher LCOE is an additional deterrent.

Union Corp is a new company that has two executives from the oil and gas industry. They have partnered with Ormat for the development of a project in Nevada. They did not understand the concept of site control in its response. There was not a well-developed plan for permitting and development. Union Corp has begun discussions with consultants and engineering firms for the transmission interconnection. A lack of geothermal and transmission interconnection experience decreases the probability of timely schedule execution. In discussions with Union Corp, the pricing was not solid and there could be room for negotiating a better price.

Cyrq has been in operations for ten years and has 150 employees. Cyrq owns and operates six plants with over 135 MW of nameplate capacity. Cyrq's RFP bid was late and considered a nonconforming bid as a result. Cyrq has offered two projects as a package in the RFP. One is an existing project that will have an expiring PPA. Site control and transmission has been established for the existing project. Cyrq did not detail the permitting schedule for the new project, Desert Queen. It is located on 4,000 acres of land for which Cyrq has leased six sections from the BLM. Cyrq is in the process of securing additional

private and railroad leases. Cyrq will be filing for the Desert Queen interconnection in August 2023. It is currently working with contractors for engineering, procurement, and construction. Both air and water cooling options are being considered. Detailed schedule plans were missing from the bid. Both of the projects in the RFP package will interconnect with the NV Energy control area. Transmission will need to be secured to member locations as appropriate. Cyrq experience in geothermal generation is a plus. There is decreased project risk with one plant already existing and well characterized. These benefits along with a lower LCOE made Cyrq the frontrunner in the RFP analysis. UAMPS staff will pursue additional detail on project schedule and permitting for the Desert Queen project as well as the anticipated 8760 profile.

The next table identifies the calculated LCOE for each of the respective bidders along with their associated project details.

Results Summary

Proposal	LCOE (2023 $/MWh)	Firm Capacity (MW)	Location	COD
Enel	$ 131.84	29.17	Cove Fort, UT	Mar-28
Fervo Project #1-Escalated	$ 126.60	28.75	Millard County, UT	Feb-29
Fervo Project #1-Fixed	$ 108.90	28.75	Millard County, UT	Feb-29
Fervo Project #2-Escalated	$ 125.93	28.75	Millard County, UT	Feb-30
Fervo Project #2-Fixed	$ 108.90	28.75	Millard County, UT	Feb-30
GeoX Project #1	$ 92.77	70.00	Newcastle, UT	Mar-28
GeoX Project #2	$ 116.40	70.00	New Peaks, UT	Feb-30
Cyrq	$ 74.83	50.36	Winnemucca/Fallon, NV	Dec 2027 & Mar 2029
Union Corp	$ 98.34	21.15	Fallon, NV	Jun-26

Table 3. LCOE Analysis Result

The Resource Project participants formed a Cyrq Geothermal Study Project to more precisely identify expected PPA and transmission costs.

Lessons Learned

There were several learning opportunities in conducting this RFP. When receiving the responses, each bidder had taken a different approach in defining the LCOE PPA cost. Some provided costs in 2023 dollars while some provided costs in future-year dollars. Some bidders assumed that UAMPS would account for CPI inflation, some did not want UAMPS to apply an escalator. Power Engineers made some assumptions in the bid pricing without validating those assumptions. Additional time was required to sort out the pricing in the bids to make comparison possible. Future RFPs should identify specific costing requirements (e.g., require pricing to be in 2023 dollars and identify any escalators that will apply) for respondents to follow in order to allow ease of UAMPS review when evaluating RFP responses.

Transmission interconnection delays and risks have increased dramatically in recent years. There was a wide range of interconnection development levels in the RFP responses. It would be valuable to include a specific transmission entry in the evaluation criteria as there is a direct bearing on the validity of project schedules and ability to meet commercial operation date deadlines.