
Kaiszen Energy Corp. Edam Micro-Thermal Interim Update February 8, 2017**Edam CSS Thermal FEED – Interim Update**

Following is an interim update of the Edam Micro-Thermal Cyclic Steam Stimulation (CSS) pilot project, where management has been evaluating the feasibility of a 5 well CSS project within the Waseca formation at Edam, Saskatchewan. The key forces influencing a pilot sanctioning recommendation include 1) Scalability – defining the size of the prize; 2) Capital requirements and operating costs; and 3) Proof of Concept – minimizing risk by attempting to duplicate past CSS results at Pikes Peak, the chosen analog for the Edam project. This interim update focuses on “where we’re at”, narrowing the scope of work based on key learnings thus far.

Summary Highlights

- Identified three core areas for thermal recovery, with 30 million bbls OOIP
- Pilot project area (Thermal Area 1) contains 8.9 million bbls OOIP. The initial 5 well pilot could be expanded to ~28 wells, where CSS would yield 2.7-3.6 million bbls of recoverable oil (RF 30-40%), and potentially higher recoveries with eventual conversion to steam drive. A successful micro-thermal initiative could then be expanded and applied within the two other thermal areas.
- Current capital estimate for the 5-well pilot is M\$7,450 (+/-25%). This includes set up and construction of surface facilities, rental steam generation, water access, and tie-in of utilities. The rental steam generation is a portable turn-key solution including set up and maintenance, and 24hr operation by 3rd and 4th class power engineers.
- Based on the Pikes Peak Waseca analog, the 5 well CSS pilot project would deliver ~400 bbls of oil per day on a calendar day average, with peak oil production of 800-900 bbls/d, and an EUR of 650mbbls.
- Source Water is not available on site, hence we will explore a commercial water permit and river intake from the North Saskatchewan, approximately 13 miles from the project area. Water volumes will initially be trucked to the pilot project.
- Utilities – Big win! - Confirmed that ample fuel gas and power are readily available through TransGas and Sask Power. There is minimal cost to Kaiszen as we are able to leverage existing infrastructure.

Next Steps – Recommendations

Following are key recommendations with an eye towards recognizing a significant contingent resource, and moving that contingent resource to reserves with minimal capital.

- 1.** Proceed to acquire the necessary permits and licencing for source water and a river water intake from the North Saskatchewan River. Arrive at a future board sanctioning meeting with certainty on source water and a permit in hand.
- 2.** Reduce the pilot project scope to a 2 well CSS project from 5 wells, and quantify the reduction in capital exposure from current estimates.
- 3.** Target board sanctioning of a 2 well CSS pilot for the week of April 10, moving to full detailed design and procurement, regulatory application, and establishing on stream targets.
- 4.** Coinciding with recommendation 2, develop a project execution plan for Thermal Area 1 in three or four phases as follows:
 - a.** Phase 1 – 2 well CSS pilot, trucking water for at least the first two steam cycles.
 - b.** Phase 2 – With favorable phase 1 results, expand the project by 5-10 CSS wells, installing a feed water flowline to support current and future thermal operations.
 - c.** Phase 3 – Full Area 1 CSS development with expansion and installation of permanent steam generating capacity and surface facilities.
 - d.** Phase 4 – Possible conversion to steam drive (line drive) for incremental recovery >40%.

Supporting details and additional information is provided below in the attached project scoping overview.

Chris McGinnis

Project Scoping Overview – Interim Update February 8, 2017

Kaisen kicked off a project scoping initiative in November 2016 with Integra Engineering Ltd., to design and provide a +/- 25% cost estimate for a modular “micro-thermal” 25mm btu/hr steam generation facility, capable of generating 250m³/d of cold water equivalent “wet” steam (80% quality steam). The proposed Edam CSS pilot was to consist of a 5 well pad (vertical and directional wells), with associated steam and production facilities capable of handling peak productivities of 1,250bbls of emulsion per day, generating peak oil sales of ~ 950bbls/d, and targeting 12-month calendar day average oil sales of 400 bbls/d.

There were a number of critical path items to consider that would have significant impacts on cost, affecting the future breadth and scope of a pilot project. These critical path items included:

- Availability and Distance to a commercial feed water supply
- Utilities – availability of fuel gas and power
- Rental steam generation – obtain costs for a fully staffed turn-key portable solution
- Understanding the complexity of treating and cooling facilities

Key Findings:

Capital Summary – 5 well CSS Project

Total Project Estimate of M\$7,450 (+/- 25%), comprised of

- M\$4,900 *surface facility (includes rental steam generator and water softening skid, where mob/demob, and 2 months of rental are capitalized)*
- M\$256 - *Transgas meter run upgrades and 1.6km of 3” flowline*
- M\$144 – *0.75km tie-in to existing salt water disposal infrastructure*
- M\$400 – *water supply – includes water security agency commercial licensing, N. Sask River intake loading tank/site, two 6” bored river intake wells.*
- M\$1,750 – *drill, case, and partial equipping of 5 vertical/directional wells for CSS.*

Project Critical Path Items

1. Raw Water Supply

1.1 Water Supply – Drilled Shallow and Deep Groundwater Test Wells Jan 2017 – Not Suitable

- Engaged a hydrologist to evaluate the merits of drilling a suitable 50gpm commercial groundwater source near the proposed pilot project site. The recommendations:
 - Best area prospects to deliver 50 gpm are 12 miles east (buried valley deposit known to yield artesian wells), and 13 miles west (North Saskatchewan River).
 - Shallower glacial drift wells in the vicinity of the project area have shown deliverability of 10-20 gpm, although it is unknown the extent to which large diameter casing plays in water build-up and storage to deliver higher rates.

- Potential for locally fractured units or sandstone deeper in the shales of the Lea Park or Colorado, but potential for this is unknown.
- Applied for and obtained a water investigation permit from the Saskatchewan Water Security Agency. Engaged Elk Point Drilling to drill and evaluate two test wells at cost M\$24.
 - Test hole #1 at 1-28-48-19w3 drilled to a depth of 302ft on Jan 18, 2017
 - Test Hole #2 at 13-22-48-19w3 drilled to a depth of 42ft on Jan 19, 2017

Both wells were abandoned after showing no potential for commercial supply.

1.2 Water Supply – Option B – Evaluate Water Permit – Sourced from N. Saskatchewan River

- Cost estimate of M\$400 to acquire surface lands, obtain water security agency permit, bore two 6" casings under the river, and set up 1,000bbl tank for storage and trucking of raw water.
- Provisions in place for eventual installation of water transfer pump and flowline to supply a commercial thermal EOR project on Kaisen's Edam lands. Should the pilot prove that a commercial expansion is feasible, capital is estimated at M\$1,500 to proceed with water transfer infrastructure to eliminate trucking, with a simple payout of 1.6 years.

1.3 Water Supply – Plan C – Other alternatives

- Although unlikely, Kaisen could approach either Husky or Serafina regarding their willingness to enter into an agreement, to supply Kaisen with raw water from their Vawn thermal operations.

Based on the preliminary findings and investigation, it is recommended that the pilot project be scaled back to minimize feed water requirements, and in-turn, capital and operating cost exposure. This can be accomplished by pursuing proof of concept with a lesser 2 well project, with an initial plan for 2 steam cycles (4 steam slugs). A 2 well CSS project is similar to the pilot executed by Pearl at Onion Lake in 2008.

2. Utilities: Fuel Gas & Power

2.1 Fuel Gas

- TransGas (Sask Crown utility) has a main pipeline which passes directly through Kaisen's Edam lands in NE 22-48-19w3, supplying fuel gas to area operations. Transgas confirmed they can supply up to 59e3m3/d from the existing take-off point at 16-22-48-19w3 with only minor upgrades to the meter run – this greatly exceeds pilot project requirements and provides excess supply for future commercial expansion. Costs to access fuel gas are minimal at M\$256, including the construction and tie-in of a 1.6km pipeline to the pilot project site.

2.2 Power

- Power – 3 phase power is available passing immediately by the pilot project site. Sask Power requires no upfront capital for power service.

3. Rental Steam Generation – Once Through Steam Generator (OTSG)

3.1 Scope of Rental Agreement

- The RCS Group of Companies (RCS) has available, options to assist producers in setting up a portable 25 MM BTU/hr steam generator skid, and associated water softening/regen skid, capable of producing 100-250m³/d of CWE steam (80% steam quality).
- We have obtained from RCS a turnkey proposal, where a 2-month rental agreement would incur costs of M\$385. This includes:
 - Mob/Demob of skids and setup of building.
 - Monthly rentals for OTSG skid, water softening and regen skid, and building.
 - All ancillary costs including staff, office accommodation and trailer, related to the safe operation of the OTSG. This includes 24hr operation and monitoring of the facility by 3rd and 4th class power engineers.
 - Following the first 2 months of operation, rental fees for equipment alone are M\$30/month (idle), and M\$125/month (fully staffed and operating).

3.2 OTSG Proven and Reliable

- The RCS portable OTSG is a sister steam generator to a permanently installed unit operating at Husky Pikes Peak for the past 20 years. It is deemed proven, safe, and reliable; where technical support services familiar with the operation, design, and construction of the OTSG are readily available in Lloydminster.

3.3 Steam Injection Requirements

- Steam injection will depend on the injection pressures observed.
- Looking at the Pikes peak analogy, steam slugs of 4,500m³ – 7,000m³ were noted, with the smallest steam slugs being injected on cycle 1 (pressure limitation). The remaining cycles were ~6,000m³ on average. With the ability to inject up to 250m³/d of CWE steam, this translates to injection periods of only 18-28 days.
- A 2-month rental and operating agreement would be required for the initial (first) steam cycles on a 2 well pilot project.

4. Complexity of Cooling and Treating Facilities – Listing of Process Equipment

- OTSG and Water Softening Skids and Buildings – Rental from RCS
- Raw water tank to feed the water softening skids
- Soft water tank with internal heat exchanger coils
 - Feed water preheat
 - Produced fluid cooling
- Brine water regen tank
- Boil off tank
- Group production tank, settling tank, and sales oil tank (with internal spreaders, coalescing columns).
- Flare knockout drum and flare stack
- Associated fluid transfer pumps, piping, and metering