

# **TUNGKOKKEL LLC**

Business Analysis



**The Fuel for the 21<sup>st</sup> Century**

Tungkokkel LLC  
3790 El Camino Real, Suite 113  
Palo Alto, California 94306  
Telephone: 1-650-305-9189  
LLC Number: 552950-42 State of Delaware

**Mission:**

- Develop, manufacture and market geothermal heat for the energy production marketplace, essentially creating a new, completely renewable fuel to replace coal, oil and gas. Create a family of related products; hydrogen, biofuels, biochar etc...
- Sequester carbon, reduce green house effect and thereby mitigate global warming.
- Saturate market with advanced technologies and products to obtain large market share and several streams of revenue.
- Partner with existing power generators and utilities to expedite implementation of technology while reducing start up costs for each participant.
- Maintain lead with best cost per unit of energy on the market.
- Build complete Molten-Salt Geothermal Power Plant - Heat Production Facilities.

**Product:**

Tungkokkel has created a process of using Molten-Salt to extract geothermal heat which can improve the efficiency of current geothermal power plants by 100% or more. Current geothermal and other renewable power plants are constrained from producing an amount of energy that is competitive with fossil fuels. Tungkokkel is capable of transporting an unlimited supply of geothermal heat to existing coal and natural gas power plants via ship, train and transport trucks. This ability to transport heat over vast distances will revolutionize how energy is produced and brought to the market. Once the infrastructure for Molten-Salt/Heat Transport has been established the means of shipping energy will be less costly and more efficient than current technologies.

Though the technologies utilized by Tungkokkel are quite sophisticated the concept in its purest form is as simple as placing a heat exchange medium, heat exchanger, into the thermal areas of the earth in order to harvest the heat with the heat exchanger. Once the heat exchange has been completed the lowered heat exchanger, thermal mass, is raised to the surface where the heat is then processed into electricity or other utility uses. Once at the surface the heat can be concentrated and raised to higher temperatures for improved production abilities. The heat can be stored for weeks at a time allowing for great flexibility for production methods and schedules. With that said the ultimate game changing attribute of Tungkokkel's method of power generation is its ability to transport energy as a thermal mass. A number of researchers and companies are already developing these technologies, however Tungkokkel owns the patent pending rights to transport all geothermal heat. (1 & 2)

**Market:**

Due to California's mandate, (Laws AB 32 and SB X1-2), to obtain 33% of its energy from Renewables by 2020 there is a built in demand for Renewable Energy.

Former Governor Arnold Schwarzenegger issued Executive Order S-3-05 requiring the state to reduce its green house gases to 80% below 1990 levels by 2050. (3)

To ensure achievement of these goals, on April 29, 2015 Governor Jerry Brown issued Executive Order B-30-15 requiring that California reduce its green house gases to 40% below 1990 levels by 2030. (4)

Gov. Jerry Brown is seeking to obtain 50% of the states energy from Renewable sources. (5)

The Clean Energy and Pollution Reduction Act of 2015, SB-350, seeks to codify Gov. Browns executive order. This legislation was approved by the Senate on 6/3/2015 and is awaiting a vote in the House. (6)

Additionally Gov. Brown has initiated a plan of investment to reduce petroleum use in cars and trucks by 50%. (7)

Power companies will need to produce approximately 390,629 Gwh of electricity by 2050 to meet California's demand and approximately 350,000 Gwh of electricity by 2030. Current demand is approximately 303,000 Gwh of electricity. There will be an increase of approximately 87,000 Gwh of usage over then next 35 years and an increase of 47,000 Gwh of usage by 2030.

*California Baseline Energy Demands to 2050 for Advanced Energy Pathways*

*Compiled by: Ryan McCarthy, Christopher Yang, and Joan Ogden*

*Institute of Transportation Studies University of California, Davis (8)*

These projections could be significantly underestimating the total demand for electrical consumption by not including the increased consumption of electric vehicles placed in use during the same time period.

California emitted 427 MMTCO<sub>2</sub>e in 1990.

California will need to reduce this amount to 256 MMTCO<sub>2</sub>e by 2030 and to  
85 MMTCO<sub>2</sub>e by 2050.

Not only will power generators need to transition to Renewables to reduce CO<sub>2</sub> output in relation to current energy production but the entirety of new electricity production must come from Renewables if California is going to achieve its CO<sub>2</sub> reduction goals.

Wind, Solar, Hydroelectric and current Geothermal technologies are incapable of providing the energy demands of the state in order to achieve CO<sub>2</sub> reduction goals. Even with the greater use of natural gas these goals are not attainable without new and better technologies to fill in this energy gap.

The practice of hydraulic fracturing to obtain natural gas directly pollutes the environment, contaminates fresh water sources and results in earthquakes. (9 & 10)

Natural Gas emits 117 lbs. of CO<sub>2</sub> for every 293 Kwh of electricity produced. (11)

Natural Gas is not the answer to meet the state's clean energy objectives.

In 2013, 131,435 Gwh of electricity, (44.31% of the state's demand), was produced by burning Natural Gas whereas 55,677 Gwh of electricity, (18.77% ), came from Renewable energy sources. (12)

In order to meet the state's goal of reducing CO2 while increasing energy production from Renewables to 50% of the state's demand:

47,000 Gwh of new electricity must be generated from Renewable, zero green house emission sources, and

72,323 Gwh of electricity currently generated by fossil fuel must be converted to obtaining its energy from Renewable sources by 2030.

A total of 119,323 Gwh of electricity that is currently not being produced by Renewables must be so by 2030.

A total of 195,314 Gwh of electricity that is currently not being produced by Renewables must be so by 2050.

This creates a significant market for Renewable energy to bridge the gap between the peak production ability of Wind, Solar, Hydroelectric and current Geothermal technologies and the state's mandate of 50%. Assuming that the former producers can achieve a 33% production rate by 2030 that leaves 17% of production unfulfilled.

As of right now, the state and power generators do not have a Renewable energy source to produce the final 17%, 59,500 Gwh of electricity, of the state's mandate for 2030.

### **Profitability:**

Given Tungkokkel's unique ability to extract and ship geothermal heat as an energy source for power generators Tungkokkel has the potential to produce the energy requirement of this final 17% mandate. Given the dearth of competitors, Tungkokkel and Tungkokkel's partners will be able to set a price that guarantees profitability from the outset.

In 2012 utilities were signing Power Purchase Agreements, PPA, with Renewable, geothermal, power generators from \$82 to \$117 per Mwh over a 20 year contract starting in 2016. <sup>(13)</sup>

Using the average of \$100 per Mwh that equals \$5.95 billion in yearly revenue, \$119 billion over 20 years to power generators that is currently available to the first generators to provide this clean energy. This should excite potential investors and partners in the energy sectors.

## Sources:

- 1) [http://www.iea-eces.org/files/annex18\\_final\\_rept\\_october\\_2010.pdf](http://www.iea-eces.org/files/annex18_final_rept_october_2010.pdf)
- 2) <http://www.engr.wisc.edu/news/archive/2009/Jun02.html>
- 3) <http://gov.ca.gov/news.php?id=18938>
- 4) <http://gov.ca.gov/news.php?id=18938>
- 5) <http://www.desertsun.com/story/news/environment/2015/02/02/developers-local-lawmaker-look-clean-energy-goal/22750773/>
- 6) <http://leginfo.legislature.ca.gov/faces/billStatusClient.xhtml>
- 7) <http://www.latimes.com/local/california/la-me-renewable-goals-20150108-story.html>
- 8) <https://escholarship.org/uc/item/3f37c9sx#page-1>
- 9) <http://www.cleanwateraction.org/fracking-california>
- 10) <http://www.cnn.com/2015/05/09/us/texas-earthquakes-fracking-studies/>
- 11) <http://www.eia.gov/tools/faqs/faq.cfm?id=73&t=11>
- 12) [http://energyalmanac.ca.gov/electricity/total\\_system\\_power.html](http://energyalmanac.ca.gov/electricity/total_system_power.html)
- 13) <http://breakingenergy.com/2012/01/23/geothermal-could-become-californias-baseload-power-commissione/>