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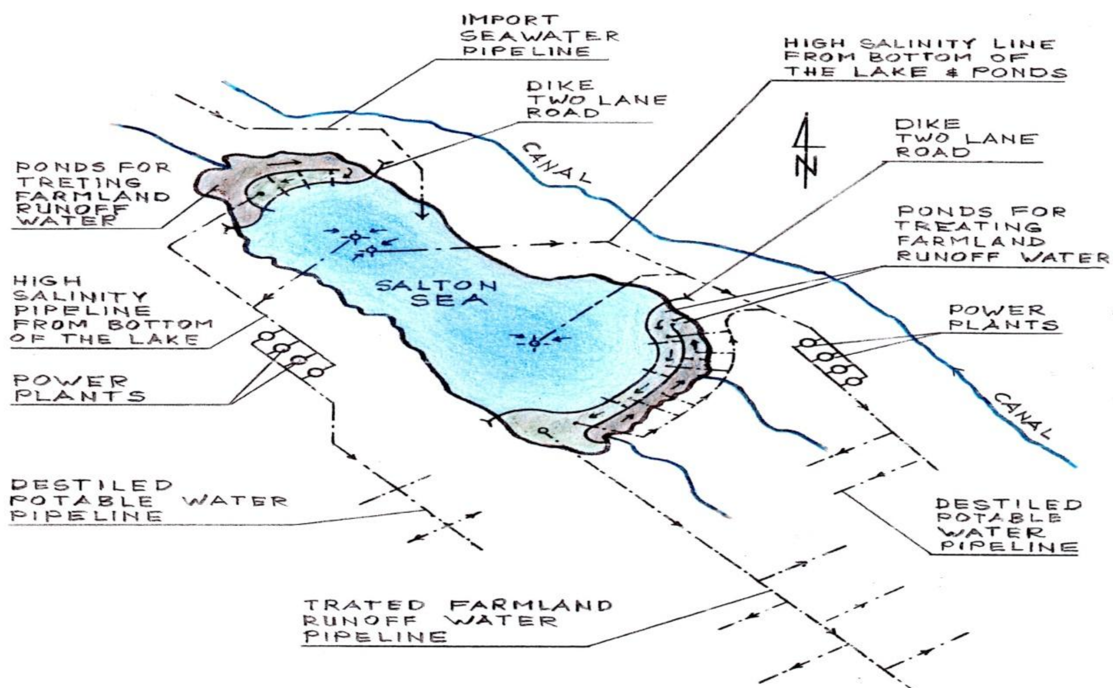
Title: Harnessing Energy and Water in a terminal lake - the Salton Sea.

Subtitle: Proposal for the Restoration of the Salton Sea - transforming the situation of environmental disaster (liability) – toxic dust storms, health issues and economic fold into a situation of prosperity (assets) – clean environment, tourism, wildlife sanctuary, production of electricity, and as byproduct potable water and lithium**.**



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References:

U.S. Patent No. 7,849,690; Entitled: "Self Contained In-Ground Geothermal Generators" (SCI-GGG); Issued on: Dec.14, 2010;

U.S. Patent No. 8,281,591; Entitled: "Self Contained In-Ground Geothermal Generators" (SCI-GGG); Issued on: October 9, 2012;

U.S. Patent No. 8,713,940; entitled: "Self Contained In-Ground Geothermal Generators"; Issued on: May 6, 2014;

U.S. Patent No. 9,206,650; Entitled: "Apparatus for drilling Faster, Deeper and Wider Well Bore"; and several patent pending applications.

Abstract of the Disclosure

Provided here is a method for harnessing geothermal energy for generation of electricity by using complete closed loop heat exchange systems combined with on-board drilling apparatus. The Scientific Geothermal Technology consists of several designs and variations complementing each other and each operating separately in many different applications in the energy sectors. There are the Self Contained In-Ground Geothermal Generator; the Self Contained Heat Exchanger; the In-Line-Pump/Generator; and preeminent drilling system for drilling wider and deeper wellbores. The system can be used for harnessing heat from accessible lava flows; harnessing the waste heat from the flame on top of flare stacks and similar cases; Also, included is an architectural solution for the restoration of the terminal lake - the Salton Sea, an area of prevalent geothermal sources. The solution includes importing seawater and providing conditions for tourism; treating farmland runoff waters; generating electricity; and producing potable water and lithium as byproducts. This solution transforms the situation of the Salton Sea from the liability of environmental disaster – toxic dust storms, health issues and economic fold - to the tremendous assets.

Overview of the Salton Sea situation:

a) The Salton Sea is California's largest lake and is presently 25 % saltier than the Ocean. The Salton Sea is a "terminal lake," meaning that it has no outlets. Water flows into it from several limited sources, but the only way water leaves the sea is by evaporation.

b) The lake is shrinking exposing the lakebed and precipitating higher salinity levels and environmental issues as well as a serious threat to its multi- billion-dollar tourist trade.

c) Under the terms of the Quantification Settlement Agreement (QSA) the lake's decline is set to accelerate starting in 2018. About the 1/3 of inflow water from the canal will be diverted to San Diego and Coachella Valley.

d) Runoff water from nearby agricultural fields which contains fertilizers, pesticides and other pollutants from Mexicali contaminate the Salton Sea and make it an undesirable tourist destination especially for beach goers.

e) The lake is 35 miles long, 15 miles wide, and is located south of Palm Springs in a basin 230 feet below sea level.

f) The Earth's crust at the south end of the Salton Sea is relatively thin. Temperature in the Salton Sea Geothermal Field can reach 680 ºF (360 ºC) less than a mile below the surface.

g) There have been many studies and complains about consequences for the nearby community if a solution for the Salton Sea is not found.

h) There have been several proposals involving importing ocean water, but they failed to address the salt balance and feasibility of the project. It was wishful thinking – canals, tunnels, pipelines without addressing the practicality of its implementation.

Summary of the Proposal for the Restoration of the Salton Sea:

The proposal for the restoration of the Salton Sea consists of five phases:

Phase I - Connecting the Salton Sea with the Ocean (preferably San Diego / Carlsbad / Oceanside area) with a pipeline 48" (5 pipelines on uphill route and 1 pipeline on downhill route);

Phase II - Building two main dikes - One in northern and one in southern part of the Salton Sea and several secondary dikes for forming ponds (wetland) for treatment of farmland runoff waters.

Phase III - Building one power plant using (SCI-GHE) system at one of selected sector;

Phase IV - Building several more power plants using (SCI-GHE) system - one in each selected sector; and

Phase V - Continued buildup of additional power plants using (SCI-GHE) system at each selected sector;

Presented proposal for the restoration of the Salton Sea includes an architectural element which harmoniously incorporates several patented technologies into a self sustaining organism.

The key elements of the presented proposal are:

1) Dividing the lake into three sections with two main dikes (two lane roads) to prevent pollution of the central part of the lake with runoff waters from nearby farmland;

2) Treating runoff waters from nearby farmland and reusing it for farmland;

3) Importing seawater from the Ocean in central section of the lake;

4) Generation of the electricity by harnessing prevalent geothermal sources;

5) Production of potable water as a byproduct;

6) Providing source for extraction of lithium;

7) Providing wildlife sanctuary; and

8) Providing condition for tourism.

The high salinity water has a tendency to accumulate at the bottom of the lake and can be used for operation of a new design of the geothermal power plants. During the production process distilled water is produced as a byproduct. Also, additional salty water is produced in a boiler as a byproduct and frequently injected into a wellbore to be used as a medium for heat conduction from hot rocks to the first heat exchanger inside the wellbore. Periodically, the brine in the wellbore especially at the bottom will reach supersaturated state and needs to be excavated through excavation line to the processing building and used as an inexpensive source for the extraction of the lithium. After extraction of lithium and other minerals the waste material can be deposited in selected and prepared pits throughout the desert and covered with dirt as it is done at properly managed trash dumping sites.

Presented proposal for the restoration of the Salton Sea has the following attributes:

a) It is a long-term solution for the restoration of the Salton Sea and the communities and it can be considered as a “Project of the Century”;

b) Dividing the lake into three sections with two main dikes (two lane roads) which would prevent further pollution of the central part of the lake with runoff waters from nearby farmlands which contain fertilizers, pesticides and sewer from Mexicali, Mexico.

c) Treating runoff water (all current inflow) in northern and southern section of the lake naturally, preferably with mangrove trees and alike and by gravity and then reusing treated water for farmland. At the present time purpose for farmland’s runoff water is to compensate for evaporation of the lake and cannot be used for farmland as it merges with the salty water of the lake.

d) Dividing the lake into three sections would provide full and different wildlife sanctuary and visitors attraction. Birds can choose which section to inhabit.

e) Importing water from the Pacific Ocean in the central section of the lake with a pipeline system of 48” diameter and maintaining level of the lake as it was in 50s and 60s, which would provide condition for tourism (hotels, motels, resorts, beaches, waterfront properties, etc.).

f) Importing water from Pacific Ocean would also eliminates the needs for expensive the “Salton Sea Management Program“, whose purpose is to constantly mediate toxic dust storms caused by exposed lakebed of the depleting lake.

g) It would generate electricity by using the “Scientific Geothermal Technology” which uses completely closed loop system (not conventional geothermal technologies on the exposed bottom of the receding lake). This system can generate much more electricity than proposed conventional geothermal power plants because it is not limited to the existing geothermal reservoirs and can be built nearby the lake without damaging lake’s original coastline and condition for tourism.

h) It would generate potable water as a byproduct without additional expenses for it and the lake could serve in the future as a hub station for the production and distribution of potable water throughout other areas of the desert.

i) It would provide an inexpensive source (super saturated brine) for extraction of lithium as a byproduct.

j) It would generate revenue in hundred billion dollars in a few decades for the nearby communities and it would continue so in the future.

k) It would provide a clean environment, preventing formation of toxic dust storms.

l) It would employ many people during construction and after construction of the project.

m) It would cost less than $10 billion, (preferably $7.5 billion) with the final result of “really” saving the Salton Sea and maintaining its water level of 50s and 60s. (about 3.5 billion dollars for pipelines; about $3 billion for dikes and wetlands – wildlife sanctuary; and about $1 billion for three Power Plants – one for each sector). Phase IV and V will be continuation of building hundreds of Power Plants – for future generation to continue where our generation started.

n) Even if the cost of the project is $20 billion - it is imperative that we do it. Because it would not just eliminate incoming environmental disaster which would cost, according to the Pacific Institute, over $70 billion in health issues of the population (asthma, cancer, etc.), drop of property value, and losing businesses - but it would provide condition for tourism, exclusive real estate, generation of electricity, generation of potable water and clean environment.

Presented proposal transforms a situation of an incoming environmental disaster (liability) into the situation of a clean environment and prosperity (assets).

<u>NOTE:</u> Think for a moment about contemporary alternative – “A Smaller, *Sustainable* Lake” with incoming hundreds square miles of exposed lakebed which needs to be managed with expensive maintenance (for which local government is asking more than $3 billion) to prevent frequent toxic dust storms; Dealing with health issues (asthma, cancer, etc.) which are already in progress. It is estimated by the Pacific Institute that the liability cost of doing nothing would rise to $70 billion in a few decades; Constantly increasing salinity and pollution of the lake and very possible would end up as a "Smaller, Sustainable Cesspool"; Loosing wildlife and clean environment; Limited production of electricity and lithium with conventional geothermal power plants. In this case only a few people would benefit on the expense of the environment and nearby communities and whole State in large.

Preliminary Cost Estimate for Phase I & II

This proposal is a preliminary design explaining the feasibility of the concept. The second stage would require collaboration with potential contractors and would contain more details, including more detailed cost estimate, which would follow with the final production design.

The range of cost today of installed pressure pipe of 48-inch diameter in various terrains is about $600 – $1,000 per linear foot.

Here is used most conservative option $1,000 per linear foot.

A mile = 5,280' x $1,000 = $5,280,000;

Distance about 160 miles.

$5,280,000 x 400 miles (80 miles uphill x 5 pipelines) = $2,112,000,000.

$5,280,000 x 80 miles (80 miles downhill x 1 pipeline) = $422,400,000.

Connecting the Salton Sea with Pacific Ocean (San Diego area) distance about 160 miles - 80 miles uphill (5 pipelines) + 80 miles downhill (1 pipeline) it ends up to about $2,534,400,000.

Because of mountain terrain + development of a new product + several pumping stations + several tanks on uphill route + several "split and join" power plants + final "delta" power plant on the final route + adding several freeway underpasses, right-of-way permits - the cost might increase 40% ending to about <u>$3.5 billion.</u>

Two main dikes (about 15 miles), separating the Salton Sea and several secondary dikes (another 15 miles), including treatment plants, could cost about $3 billion, which would add up (I & II phase) to about <u>$6.5 billion</u>.

Three Power Plants (final development of the system, including drilling system, and production of one at each sector) might come to about <u>$1 billion.</u>

Preliminary Cost Estimate for Phase III & IV

Proposed Geothermal Power Plant(s) - the “Scientific Geothermal Technology” consists of 24 well-bores and with many projected power plants (in 100s) drilling is most expensive and most important part, therefore we need to implement a new system for drilling faster, deeper and wider wellbores.

The cost for 60” diameter wellbore 8,000 feet deep might cost about $3 M;
24 wellbore x $3M = $75,000,000;

Binary Power Unit of 4 MW might cost about $100,000;
(Binary Power Unit of 4 MW is modest assumption.)

24 Binary Power Unit x $100,000 = $2,400,000;

The control center might cost about $4,600,000;

The potable water pond might cost about $5,000,000;

Piping system might cost about $2,000,000;

A new derrick might cost about $9,000,000;

One Geothermal Power Plant might cost about $98,000,000; ~ $100,000,000;

10 Power Plant including final development of the drilling system might cost about $1,000,000,000;

The new drilling system is more expensive at this earlier stage because of development cost, but in the long term it would be better and less expensive solution.
Several initiating power plants on several sectors around the Salton Sea would be able to provide finance for subsequent power plants.

More power plants we build with initial budget the faster we will precede with subsequent power plants and whole project, which final result will be more clean energy and more potable water.

It is realistic to conclude that Phases I – IV, would cost around $10 billion dollars, (preferably less) with the final result of “really” saving the Salton Sea and providing conditions for tourism, clean energy, potable water, and prosperous economy.

Production Capacity of one Geothermal Power Plant

Proposed Geothermal Power Plant(s) the “Scientific Geothermal Technology” consist of 24 well-bores and 24 Binary Power Units;

24 Binary Power Units x 4 MW = 96 MWh; ~ 100 MWh;

Assumed price of $60 per MWh;

$60 x 96 MWh = $5,760 per hour;

$5,760 x 24h = $138,240 per day;

$138,240 x 365 days = $50,457,600 per year;

Technology Summary:

There is an infinite source of energy under our feet, whether it is a few miles underground or on the ground surface in locations such as Hawaii. The question was, until now, how to harness it expediently and efficiently without polluting the environment? Presented methodology capitalizes on our planets natural internal heat.

The essence of the “Scientific Geothermal Technology” is transferring heat from heat sources to the power units with a completely closed loop systems.

The "Self Contained In-Ground Geothermal Generator" (SCI-GGG) system uses several completely closed loop systems and generates electricity down at the heat source and transmits it up to the ground level by means of electrical cables.

The SCI-GGG apparatus consists of: a boiler; a turbine; a converter; a generator; a condenser distributor; and a condenser that are arranged to function in confined spaces such as in a well bore. The SCI-GGGG absorbs heat from the source of heat (hot rocks and/or geothermal reservoir) and generates electricity at the heat source which is transmitted by cable to the ground surface to electrical grids for use in houses and industry.

In the process of cooling the engine compartments with a separate closed loop system which is the “Self Contained In-Ground Heat Exchanger” (SCI-GHE system) additional electricity is generated on the ground surface.

The "Self Contained In-Ground Heat Exchanger" (SCI-GHE) system is an integral part of the SCI-GGG system and can function independently. The system consists of a closed loop thermally insulated line with 2 coiled pipes (heat exchangers) and a few in-line- pumps. The first heat exchanger is lowered to the bottom of the wellbore at the heat source and the second heat exchanger is coupled into a binary power unit on the ground surface which produces electricity by using the Organic Rankine Cycle (ORC). Electricity is then transmitted through an electric grid.

Although the (SCI-GHES) system has a higher production capacity at this project at this early stage priority is given to the SCI-GHE system because of its less expensive production and easier maintenance.

The presented proposal also includes a method for harnessing geothermal energy for generation of electricity by using complete closed loop heat exchange systems combined with on-board drilling apparatus.

The In-Line-Pump is an integral part of both SCI-GGG and SCI-GHE systems, circulating fluids through closed loop systems.

The In-Line-Pump is an electromotor cylindrical shape and is inserted as a repetitive segment in the pipeline. It has a hollow cylinder as a shaft of the rotor with continues spiral blades inside hollow shaft. It yields a maximum flow rate with limited diameter.

Alternatively, the In-Line-Pump can be inserted as a repetitive segment of a riser pipe for pumping fluids up to the ground surface from reservoirs in which geo-pressure is low. Also, the In-Line-Pump can be used as a repetitive segment in cross-country pipeline for transporting oil, water, etc. In downhill route it functions as a generator and generates electricity, which can be used to supplement in-line-pumps in horizontal and uphill route.

Methodology for Drilling Faster, Deeper, and Wider Well Bore

Contemporary drilling system has limitations how wide and deep wellbore can be drilled. Mud is injected through the pipe and through several orifices at the drill bit. Mud circulates up between pipe and wall of the well bore providing a necessary stream for cutting to be excavated. By increasing the size of the drill bit (wellbore) and / or by increasing the depth of the wellbore it requires a tremendous increase of pressure inside the pipe to form a corresponding stream for excavation of cuttings;

Presented system for drilling faster, deeper and wider wellbore consist of motorized drill head; separate excavation line; separate fluid delivery line; and separate closed loop cooling line engaged with Binary Power Unit on the ground surface.

The Binary Power Unit consists of: a Boiler; a Turbine; a Condenser; and a Generator.

The boiler is coupled with coil (Heat Exchanger) from a separate close loop engine cooling line circulating fluid from motorized drill head. A generator of the binary unit generates electricity to supplement power for the motorized drill head. Presented drilling apparatus has retractable bits on the motorized drill head. Also, the casing of the wellbore can be build during the drilling process.

The diameter of the excavation line and rate of flow of mud and cuttings through it and the diameter of the fluid delivery line and rate of fluid flow through it are in balance requiring only limited fluid column at the bottom of the well bore.

Fluid column may exist through whole wellbore to sustain the wellbore during drilling process, but not for excavation purpose. The excavation process continues regardless of the diameter of the drill head (wellbore); therefore this method eliminates well known drilling limitations relative to the depth and diameter of the wellbore.

Transformational Merit:

Regarding geothermal power plants:

Presently, wells are drilled into the geothermal reservoirs to bring the hot water to the surface. At geothermal power plants, this hot water is piped to the surface. Then, after removing silica in some cases, steam is created and used to spin turbines creating mechanical energy. The shaft from the turbines to the generator converts mechanical energy to electrical energy. The used geothermal water is then returned down though injection well into the reservoir to be reheated, to maintain pressure, and to sustain the reservoir.

There are three kinds of geothermal power plants. The kind is build depends on the temperatures and pressures of a reservoir.

There is also an experimental Enhanced Geothermal System. In order to function properly Enhanced Geothermal Systems (EGS) needs three crucial factors: Horizontal rock formation, Permeability of the rocks, Heat and substantial amount of Water. Those are serious limitations. The EGS is based on exploring certain locations (nests) and injecting water in those locations until heat from hot rocks is depleted (about 4-5 years) and then moving to another (preferably nearby) location and then repeating the process and after 3-5 years returning to previous location which would by that time replenish the heat generated from radioactive decay and internal heat. I call it “horizontal approach” since geothermal water between injection well and production well travels typically horizontally.

The presented proposal implements the “Scientific Geothermal Technology”. Embodiments of the system of the present invention promote a progressive “vertical approach” to reach and utilize heat from hot rocks or other heated surrounding environment rather than the horizontal approach used in Enhanced Geothermal System (“EGS”).

Because the "Self Contained In-Ground Geothermal Generator" (SCI-GGG system) and “Self-Contained In-Ground Heat Exchanger” (SCI-GHE system) uses a completely closed loop systems, the permeability of the rocks, horizontal rock formations and substantial amount of underground water is of lessen importance, because the systems operate in a “vertical approach” and the heat exchanging surface of the wellbore can be increased by drilling deeper wellbore. When cooling of surrounding rocks eventually occurs, it would only be necessary to circulate the geothermal fluid in a wellbore around the first heat exchanger with an in-line-pump secured below the first heat exchanger. Having an additional dept of the wellbore, let’s say a mille below heat exchanger, with a diameter of 5’-6’ the heat exchanging surface of the wellbore will be sufficient and heat flux should not be an issue especially if temperature of the surrounding rocks is over 200º C.

If cooling of the rocks becomes an issue again we can turn on drilling apparatus, which is a permanent part of the heat exchange apparatus, and drill an additional distance, let’s say, a few hundred yards, to reach hot rocks and lower the apparatus at the new depth. The extended depth will result in hotter rock formations and higher heat flux. Eventually, a point will be reached where heat extraction from rocks and heat replenishment to the rocks from the heat generated by radioactive decay and internal heat will be in balance and/or equilibrium.

The power plant comprising an array of wellbores having an extendable length for periodically extending the length of each wellbore; multiple power units corresponding to each wellbore, wherein each power unit includes a heat exchanger, each heat exchanger located within one wellbore of the array of wellbores, wherein the power generated corresponds to the number of wellbores and heat exchangers. The system of power units is a modular system capable of easy adjustments and reproduction.

Regarding source for Lithium production:

Lithium – a soft silver-white element that is the lightest metal known - is in high demand because is used for the production of batteries, ceramic, aluminum and alloys.

In Chile and Bolivia the brines that are used to produce lithium (and other alkali metals) are supersaturated, and sitting on the surface in playas (salt pans). That makes them much more economical than saline groundwater. Bolivia has huge reserves that the government is planning to put into production in cooperation with foreign companies. Seawater is a very poor source because the lithium concentration of sea water is about 0.2 parts per million (e.g., recovery of 1 ton of lithium requires treating 5 million tons of water).

There are several known methods for production of lithium. The SRI International company is tasked with two-year mission by the Energy Department's Geothermal Technologies Office – focusing on advances in lithium recovery from geothermal brines using ion-imprinted polymers. To support this goal, SRI's immediate technical objective is to further advance the performance and efficiency of ion-imprinted polymers to achieve optimal lithium separation rates exceeding 95%.

Earlier tests have already demonstrated that the polymer-based approach can yield a retrievable rate of more than 90%, so the Energy Department is confident that SRI can further refine the process and push that rate over 95%. Curtsey to the article at the link below.

http://www.desertsun.com/story/tech/science/energy/2017/02/10/salton-sea-geothermal-plant-would-use-lithium-tech-caught-teslas-eye/97743092/.

The lithium can be produced from saturated brine, but the processes of reaching saturated brine require extra efforts, processes and energy which increases production cost.

Presented proposal for the restoration of the Salton Sea, which can be implemented with minor modifications in many similar locations worldwide provide inexpensive and renewable source of the saturated brine for whichever process for extraction of lithium and other alkaline metals and minerals is going to be used.

In the presented proposal a distiller/boiler is filled with salty water from the nearby sources. After at least half of salty water from a boiler evaporates and after passing through turbine of the power unit (plant) as exhausted steam, it is condensed as potable water. The remaining, now higher salinity brine, from the boiler is deposited (stored) into the wellbore to provide a medium for heat conduction from hot rocks to the first heat exchanger in the wellbore. After a certain period of time at the bottom of the wellbore will be accumulated highly saturated brine which frequently needs to be pumped out through the excavation line to the processing building for extraction of lithium and other alkaline metals and minerals.

The processing building for extraction of lithium and other alkaline metals and minerals is designed so to induce evaporation and collect potable water without using additional electricity which also contributes to lower production cost.

Regarding drilling system:

Contemporary drilling system has serious limitations how wide and deep wellbore can be drilled. Mud is injected through the pipe and through several orifices at drill bit and circulates up between pipe and wall of the wellbore providing a necessary stream for cutting to be excavated. By increasing the size of the drill bit (wellbore) and / or by increasing the dept of the wellbore it requires a tremendous increase of pressure inside the pipe to form a corresponding stream up for cuttings to be excavated. Also, wellbore have gradually smaller diameter with each subsequent section because of the casing.

The presented proposal provides a solution for drilling deeper and wider wellbores with the constant diameter. Presented system for drilling faster, deeper and wider wellbore consist of motorized drill head; separate excavation line; separate fluid delivery line; and separate closed loop cooling line engaged with Binary Power Unit on the ground surface. Presented drilling apparatus has retractable bits on the motorized drill head. Also, the casing of the wellbore can be build during the drilling process. The apparatus consists of the elevator sliding over the drilling/excavation/heat exchange apparatus delivering and installing casing sheets and concrete.

Regarding pumping stations:

Contemporary pumping stations and hydroelectric power plants are expensive and have restrictions with a location, capacity, and access.

The presented proposal provides a solution for an efficient water transfer.

Downhill routes of pipeline can be built using several cascades with “split and join” hydropower plants to avoid buildup of extreme pressure in the pipeline especially in the last section of the final downhill route. By using several cascades with several “split and join” hydropower stations this system will harness kinetic energy and minimize loses. Also, final downhill route of the pipeline has “delta” system hydropower plant to increase efficiency in harnessing kinetic energy by splitting flow of water after primary in-line-generators. The main in-line-generators are the first generators after the cascade drop with less exposed spiral blades inside the shaft/pipe harnessing energy and allowing fluid flow to continue to the subsequent smaller pipes with slightly lesser speed. After exiting the main in-line-generators the flow is splits in two subsequent smaller branches with smaller in-line-generators which have more exposed spiral blades inside shaft/pipe. By splitting fluid flow into smaller branches with lesser fluid flow speed in each subsequent branch therefore increasing efficiency of harnessing kinetic energy and at the same time allowing the same mass of water to leave pipeline and enter the lake as the amount of water entering pipeline from the Ocean. The presented solution increased efficiency of harnessing kinetic energy and minimizes loss of energy that would occur due to resistance in the pipeline during 80 miles long downhill route.

In order to accommodate the same amount of water exiting downhill pipeline the same amount of water needs to enter the pipeline at uphill route. That is achieved by having several pipelines comprising the uphill route with lesser fluid speed through them.

Regarding importing seawater:

In several decades had been mentioned several proposal by different authors about importing water from the Ocean but they all failed to address: salinity balance of the lake – proposing expensive processes such as reverse osmosis and distillers which require substantial amount of electricity, maintenance of filters, etc.; not addressing continuation of pollution from nearby farmland; practicality of the projects - implementing canals, lagoon, and pipelines using siphon system, etc.; and extreme cost which could not be repaid.

Presented proposal is quite different - it incorporates in final comprehensive design, several patented technologies – that have not been accessible to the authors of previous proposals. The presented proposal has an architectural element which harmoniously incorporates several patented technologies in a functional self-sustaining organism.

NOTE: Alternatively - If forever reason construction of the pipeline for importing seawater into the Salton Sea is delayed, production of the Power Plants can continue with minor modification in design. For example: The boiler of power units can operate with working fluids such is isobutene, isopentan, etc., instead with salty water from the lake. In such case the power plant would produce electricity, but would not produce as byproduct potable water and would not produce saturated brine for the production of lithium. Later on as pipeline is completed the power plants could be modified to use seawater as originally designed.

In the meantime, during construction of the pipeline, as an alternative, the power plant could continue its operation using salty water from the bottom of the lake to generate electricity and saturated brine for the production of lithium. Produced potable water can be returned into a lake to sustain depleting lake and to reduce its salinity.

Since importing seawater from the Ocean, especially route over the mountain, require a substantial amount of electric power one or two power plants, out of many proposed, can be designated for production of electricity to be used for importing seawater from the Ocean. Importing seawater from the Ocean is a fundamental phase of this comprehensive project on which other phases depend. Illustrations are provided in PowerPoint Presentation slides.

There are several possible routes for importing seawater from the Ocean to the Salton Sea.

Preliminary analyzes of several route options:

Rough calculations for several routes for importing seawater to the Salton Sea

PE (Potential Energy) = M G H

==> Mass x Gravitation x Height (in meters)

Water that falls through pipe or exit under pressure from pipe (turbine)

KE (Kinetic energy) $= {}^{1}/_{2} \times M \times V^2$

M = mass
V = velocity of the water at the nozzle (exit)

Difference between surface of the Ocean and surface of the Salton Sea is - 230 feet (about 70 meters).

Route # 1 - Importing seawater from the Gulf of California – corridor: San Felipe - Mexicali, Mexico, - Salton Sea.

Free Fall:

$S = ½ g \times t^2$;

S = Vertical distance;

g = gravity = 9.81;

t = time

Free Fall values at 70 meters drop:

$S = ½ g \times t^2$

$70 = ½ \times 9.81 \times t^2$

$t^2 = 140 / 9.81 = 14.27$

$t = \sqrt{14.27} = 3.77$ seconds

Speed of water at nozzle at the bottom of the vertical fall at 70 meters:

V = g x t

V = 9.81 x 3.77 = 37.05 meters per second (41.01 y/s)

Kinetic Energy

For 70 meter drop from top of the hill to the surface of the lake

The surface of the lake is 70 meters below ocean level.

Speed of the water at the surface of lake or at the turbine is 37.05 m/s (41.01 y/s)

$Ek = ½ M \times V^2$

Ek = Kinetic Energy

M = Mass

M = Ek x 2/ V²

M = 1.16 m^2 x 37.05 = 42.98 m^3 => 42.98 x (994kg = weight of water at 100 ºF) = 42,720kg

(42,720 kg is the volume / mass of water per second).

Ek = ½ M x V² = ½ x 42,720 kg x (37.05 x 37.05) => ½ x 42,720 kg x 1,372.7

=> ½ 58,641,744 = 29,320,872 MWs in period of one hour it is 29.3 MWh

Efficiency factor usually used is 15% loss => 29.3 MWh x 0.85 = 24.9 MWh

At this early stage without final testing of the new system, I believe that by using "delta" hydropower plant which harness energy after main turbine using mass and speed of fluid (no gravity) can be harnessed an additional 10% of energy which is about 2.4 MWh which end up to about 27.3 MWh.

It is realistic to expect that starting with 5 pipelines with diameter of 48" and speed of seawater 7.4 m/s (8.2 y/s) at Gulf of California (near San Felipe) and then gradually reducing number of pipelines through several sections of 150 miles distance to 5, 3, and 1 pipeline (50 miles x 5 pipelines + 50 miles x 3 pipelines + 50 miles 1 pipeline) in a few weeks the speed of seawater through pipeline will stabilized and will continue without using initial in-line-pump at the entrance of the pipeline.

Diameter of pipe is 48"

$A = \pi r^2$ = 3.14 x (2x2) = 12.56 f²
12.56 f² / 9 = 1.39 y² = 1.16 m²

1.39 y² x 41.0 y per s = 57.00 y³ x (31,536,000 seconds in a year) = 1,797,674,900 y³ = 1,114,261 acre foot per year. This is volume of seawater entering the lake through one pipe with diameter 48" at speed of 41.0 y/s (yard per second).

V = velocity => 7.4 m/s = 8.2 y/s is the speed that is needed to pump water from the ocean through 5 pipelines of 48" diameter to balance for evaporation at the lake's surface which is about 1,100,000 acre foot per year.

The volume / mass of water (42,720 kg) per second exiting the main in-line-generator at speed of 37 mps (41 y/s) and after "delta" hydropower plant entering the Salton Sea is the same mass of water (42,720 kg) per second entering 5 pipelines in Gulf of Mexico at speed of 7.4 mps (8.2yps).

Production Capacity of the Hydropower Plant:

Assumed price of $60 per MWh;

$60 x 27.3 MWh = $1,638 per hour;

$1,638 x 24h = $39,312 per day;

$39,312 x 365 days = $14,348,880 per year;

The Route # 1 would be the least expensive because of suitable topography of the terrain – about 10 meters elevation to overcome, but it deals with the "Other Country issue" which is a big issue.

Our government could negotiate a treaty with Mexico for access to seawater;

a) A long term deal paying Mexico's government about $50 million per year for 1,000,000 acre/feet per year of seawater.

b) In return for seawater we could engage in deal to lease lend nearby Cerro Prieto build Power Plants (Scientific Geothermal Technology), which is superior to contemporary geothermal systems, for production of electricity, potable water for Mexicali, which they desperately need, and production of lithium.

Route # 2 - Importing seawater from the Ocean – corridor: Oceanside – Temecula - San Jacinto - (existing tunnel) – Cabazon - Salton Sea. Elevation to overcome is 1,600' (488 m).

Pipeline distance is about 160 (150) miles.

Downhill routes of pipeline can be built using several cascades with "split and join" hydropower plants to avoid buildup of extreme pressure in the pipeline especially in the last section of the final downhill route. By using several cascades with several "split and join" and "delta" hydropower stations this system can harness more kinetic energy and minimize loses.

Free Fall values at 488 meters + (70 meters Ocean to Lake difference) = 558 meters

On this route can be used 2 cascades each with 279 m drop and 6 uphill pumping stations.

Free Fall:

$S = ½ g x t^2$;

S = Vertical distance ;

g = gravity = 9.81 ;

t = time

Free Fall values at 279 meters

$S = ½ g x t^2$

$279 = ½ x 9.81 x t^2$

$t^2 = 558 / 9.81 = 56.88$

$t = \sqrt{56.88} = 7.54$ seconds

Speed of water at nozzle at the bottom of the vertical fall at 279 meters:

V = g x t

V = 9.81 x 7.54 = 73.98 m/s = (80.9 y/s)

Kinetic Energy

For 279 m drop (first cascade) to the first in-line-turbine /generator.

Speed of the water at the exit of first in-line-turbine /generator is 73.98 m/s = (80.9 y/s)

Ek = ½ M x V^2

Ek = Kinetic Energy

M = Mass

M = Ek x 2/ V^2

M = 1.16 m^2 x 73.98 m/s = 85.81 m^3 => 85.81 x (994kg = weight of water at 100 ºF) = 85,302 kg

(85,302 kg is the volume / mass of water per second).

Ek = ½ M x V^2 = ½ x 85,302 kg x (73.98 m/s x 73.98 m/s) => ½ x 85,302 kg x 5,473

=> ½ 466,857,840 = 233,428,920 MWs in period of one hour it is 233.43 MWh

Efficiency factor usually used is 15% loss => 233.43 MWh x 0.85 = 198.41 MWh

Two such cascade drops adds to 198.41 MWh x 2 (cascade drops) = 396.82 MWh

At this early stage without final testing of the new system, I believe that by using "split and join" hydropower plants and "delta" hydropower plant which harness energy after fluid leaves main turbine using mass and speed of fluid (no gravity) can be harnessed additional 10% of energy which is about 39.6 MWh. In this case it end up to about 436.4 MWh .

Energy needed to transport the same amount of water through uphill pipeline section(s) which in this case (Route # 2) is 1,600' (488 m).

EP = M x g x h = 85,302 kg x 9.81 x 488 m = 408,364,550 MWs in an hour it is 408.3 MWh

Efficiency factor could be around 40% => 408.3 MWh x 1.4 = 571 MWh.

Energy Net for Route # 2: 436.4 MWh – 571 MWh = - 134.5 MWh

For this route could be designate two (2) out of many planed geothermal power plants to generate power for importing water.

Route # 3 - Importing seawater from the Ocean – corridor: Oceanside - Temecula - San Jacinto - Beaumont. Elevation to overcome is 2,700‘ (823 m).

Pipeline distance is about 160 miles.

Downhill routes of pipeline can be built using several cascades with "split and join" hydropower plants to avoid buildup of extreme pressure in the pipeline especially in the last section of the final downhill route. By using several cascades with several "split and join" and "delta" hydropower stations this system can harness more kinetic energy and minimize loses.

Free Fall values at 823 meters + (70 meters Ocean to Lake difference) = 893 meters

On this route can be used 3 cascades each with 297 m drop and 9 uphill pumping stations.

Free Fall:

$S = ½ g \times t^2$;

S = Vertical distance ;

g = gravity = 9.81 ;

t = time

Free Fall values at 297 meters

$S = ½ g \times t^2$

$297 = ½ \times 9.81 \times t^2$

$t^2 = 594 / 9.81 = 60.55$

$t = \sqrt{60.55} = 7.78$ seconds

Speed of water at nozzle at the bottom of the vertical fall at 297 meters:

$V = g \times t$

V = 9.81 x 7.78 = 76.33 m/s = (83.47 y/s)

Kinetic Energy

For 297 m drop (first cascade) to the first in-line-turbine /generator.

Speed of the water at the exit of first in-line-turbine /generator is 76.33 m/s = (83.47 y/s)

$Ek = ½ M \times V^2$

Ek = Kinetic Energy

M = Mass

$M = Ek \times 2/ V^2$

M = 1.16 m^2 x 76.33 m/s = 88.54 m^3 => 88.54 x (994kg = weight of water at 100 ºF) = 88,008kg

(88,008 kg is the volume / mass of water per second).

Ek = ½ M x V^2 = ½ x 88,008 kg x (76.33 m/s x 76.33 m/s) => ½ x 88,008 kg x 5,826

=> ½ 512,734,600 = 256,367,300 MWs in period of one hour it is <u>256.36 MWh</u>

Efficiency factor usually used is 15% loss => <u>256.36 MWh</u> x 0.85 = <u>217.90 MWh</u>

Three such cascade drops adds to 217.90 MWh x 3 (cascade drops) = <u>653.7 MWh</u>

At this early stage without final testing of the new system, I believe that by using "split and join" and "delta" hydropower plant which harness energy after fluid leaves main turbine using mass and speed of fluid (no gravity) can be harnessed at least additional 10% of energy which is about 65.3 MWh. In this case it end up to about <u>719.0 MWh</u> .

Energy needed to transport the same amount of water through uphill pipeline section(s) which in this case (Route # 3) is 2,700' (823 m):

EP = M x g x h = 88,008 kg x 9.81 x 823 m = 710,544,020 MWs in an hour it is <u>710.5 MWh</u>

Efficiency factor could be around 40% => 710.5 MWh x 1.4 = 994.7 MWh.

<u>Energy Net for Route # 3:</u> 719.0 MWh – 994.7 MWh = - 275.7 MWh

For this route could be designate three (3) out of many planed geothermal power plants to generate power for importing water.

<u>Route # 4</u> - Importing seawater from the Ocean – corridor: Oceanside - Borrego Springs – Salton Sea. Elevation to overcome is 3,600' (1,097 m).

Pipeline distance is about 100 miles.

Downhill routes of pipeline can be built using several cascades with "split and join" hydropower plants to avoid buildup of extreme pressure in the pipeline especially in the last section of the final downhill route. By using several cascades with several "split and join" and "delta" hydropower stations this system can harness more kinetic energy and minimize loses.

<u>Free Fall values at 1,097 meters + (70 meters Ocean to Lake difference) = 1,167 meters</u>

On this route can be used 4 cascades each with 292 m drop and 11 uphill pumping stations.

<u>Free Fall:</u>

S = ½ g x t^2 ;

S = Vertical distance;

g = gravity = 9.81;

t = time

Free Fall values at 292 meters

$S = ½ g \times t^2$

$292 = ½ \times 9.81 \times t^2$

$t^2 = 584 / 9.81 = 59.53$

$t = \sqrt{59.53} = 7.71$ seconds

Speed of water at nozzle at the bottom of the vertical fall at 292 meters:

$V = g \times t$

V = 9.81 x 7.71 = 75.7 m/s = (82.78 y/s)

Kinetic Energy

For 292 m drop (first cascade) to the first in-line-turbine /generator.

Speed of the water at the exit of first in-line-turbine /generator is 75.7 m/s = (82.78 y/s)

$E_k = ½ M \times V^2$

Ek = Kinetic Energy

M = Mass

$M = E_k \times 2 / V^2$

M = 1.16 m^2 x 75.7 m/s = 87.81 m^3 => 87.81 x (994 kg = weight of water at 100 ^oF) = 87,285 kg

(87,285 kg is the volume / mass of water per second).

Ek = ½ M x V^2 = ½ x 87,285 kg x (75.7 m/s x 75.7 m/s) => ½ x 87,285 kg x 5,730.45

=> ½ 500,185,810 = 250,092,900 MWs in period of one hour it is 250 MWh

Efficiency factor usually used is 15% loss => 250 MWh x 0.85 = 212.5 MWh

Two such cascade drops adds to 212.5 MWh x 4 (cascade drops) = 850 MWh

At this early stage without final testing of the new system, I believe that by using “split and join” hydropower plants and “delta” hydropower plant which harness energy after fluid leaves main turbine using mass and speed (no gravity) can be harnessed additional 10% of energy which is about 85 MWh. In this case it end up to about 935 MWh .

Energy needed to transport the same amount of water through uphill pipeline section(s) which in this case (Route # 3) is 3,600‘ (1,097 m):

EP = M x g x h = 87,285 kg x 9.81 x 1,097 m = 939,323,630 MWs in an hour it is 939 MWh

Efficiency factor could be around 40% => 939 MWh x 1.4 = 1,315 MWh.

Energy Net for Route # 4: 935 MWh – 1,315 MWh = - 380 MWh

For this route could be designate four (4) out of many planed geothermal power plants to generate power for importing water.

The Route # 4 has distance of about 100 miles which would have advantage in pipeline cost.

Preliminary Pipeline Cost Estimate

Regarding Pipeline Route # 1:

The range of cost today of installed pressure pipe of 48-inch diameter in various terrains is about $600 – $1,000 per linear foot. Here is used most conservative option $1,000 per linear foot.

The Route # 1 has distance of about 150 miles with preferred topography which has an advantage in pipeline cost. Let’s assume $600 per linear foot.

One mile 5,280 ‘ x $600 = $3,168,000.

$3,168,000 x 450 miles relatively flat terrain (50 miles x 5 pipelines + 50 miles x 3 pipelines 50 miles 1 pipeline) = $1,425,600,000

Because of a new product development + several pumping stations which will work temporally + final “delta” power plant on the final route + adding several freeway underpasses, right-of-way permits - the final cost might increase 20% to about $1.7 billion.

Regarding Pipeline Route # 2:

The range of cost today of installed pressure pipe of 48-inch diameter in various terrains is about $600 – $1,000 per linear foot. Here is used most conservative option $1,000 per linear foot. A mile = 5,280’ x $1,000 = $5,280,000;

The Route # 2 has distance of about 150 miles.

$5,280,000 x 375 miles (75 miles uphill x 5 pipelines) = $1,980,000,000.

$5,280,000 x 75 miles (75 miles downhill x 1 pipeline) = $396,000,000.

$2,376,000,000

Connecting the Salton Sea with Pacific Ocean (San Diego area) distance about 150 miles - 75 miles uphill (5 pipelines) + 75 miles downhill (1 pipeline) it ends up to about $2.376 billion.

Because of mountain terrain + development of a new product + several pumping stations + several tanks on uphill route + several "split and join" power plants + final "delta" power plant on the final route + adding several freeway underpasses, right-of-way permits - the final cost might increase 40% to about <u>$3.32 billion</u>. The benefit of this route is using existing tunnel 13 miles long from Cabazon to San Jacinto.

If the option - to pump out high salinity water from bottom of the lake with left over after extraction of lithium and to disperse it into vast Ocean - is going to be implemented a single pipeline of 24" diameter would be adequate. It is reasonable to expect that cost of each route would increase for about 1/3 of original estimate. If needed an additional pipeline of 24" diameter could be installed.

<u>Regarding Pipeline Route # 3:</u>

The Route # 3 has distance of about 160 miles.

$5,280,000 x 400 miles (80 miles uphill x 5 pipelines) = $2,112,000,000.

$5,280,000 x 80 miles (80 miles downhill x 1 pipeline) = $422,400,000.

Connecting the Salton Sea with Pacific Ocean (San Diego area) distance about 160 miles - 80 miles uphill (5 pipelines) + 80 miles downhill (1 pipeline) it ends up to about $2,534,400,000.

Because of mountain terrain + development of a new product + several pumping stations + several tanks on uphill route + several "split and join" power plants + final "delta" power plant on the final route + adding several freeway underpasses, right-of-way permits - the cost might increase 40% to <u>about $3.5 billion</u>

If the option - to pump out high salinity water from bottom of the lake with left over after extraction of lithium and to disperse it into vast Ocean - is going to be implemented a single pipeline of 24" diameter would be adequate. It is reasonable to expect that cost of each route would increase for about 1/3 of original estimate. If needed an additional pipeline of 24" diameter could be installed.

<u>Regarding Pipeline Route # 4:</u>

The Route # 4 has distance of about 100 miles which has an advantage in pipeline cost

$5,280,000 x 250 miles (50 miles uphill x 5 pipelines) = $1,320,000,000.

$5,280,000 x 50 miles (50 miles downhill x 1 pipeline) = $264,400,000.

Connecting the Salton Sea with Pacific Ocean (San Diego area) distance about 100 miles - 50 miles uphill (5 pipelines) + 50 miles downhill (1 pipeline) it ends up to about $1.584 billion.

Because of mountain terrain + development of a new product + several pumping stations + several tanks on uphill route + several "split and join" power plants + final "delta" power plant on the final route + adding several freeway underpasses, right-of-way permits - the final cost might increase 40% to about $2.2 billion.

High salinity water (brine) has higher density and has tendency to accumulate at the lowest point(s) at the bottom of the lake where can be access, pump it up and used in a new design of geothermal power plants for generation of electricity, and as byproducts produce potable water and lithium.

As an option - we could pump out high salinity water from bottom of the lake with a single pipeline 24" diameter and disperse it into Ocean: A few miles offshore near Carlsbad there is a trench called "Carlsbad Canyon" through which high salinity water would slide slowly into depth of the Ocean and find its way to join existing currents in the vast ocean without negative effect on marine life.

Hyper saline water – brine - is in sync with natural occurrence in oceans and together with temperature difference the main engine in currents circulation in Oceans - called "deep ocean currents" or thermohaline circulation.

If the option - to pump out high salinity water from bottom of the lake with left over after extraction of lithium and to disperse it into Ocean - is going to be implemented a single pipeline of 24" diameter would be adequate. It is reasonable to expect that cost of each route would increase for about 1/3 of original estimate. If needed an additional pipeline of 24" diameter could be installed.

<u>Rough estimate for energy needed to pump out and transport high salinity water from bottom of the lake and transport it into the Ocean - **Route # 1**:</u>

Diameter of pipe is 24" = 2'

$A = \pi r^2$ = 3.14 x 1^2 = 3.14 f^2
3.14 f^2 / 9 = <u>0.348 y^2</u> = <u>0.2916 m^2</u>

Mass = 0.2916 m^2 x 10 meter per second (estimated reasonable speed) = 2.9 m^3 =>

2.9 m^3 x (994 kg = weight of water at 100 ºF) = 2,882.6 kg

(2,882 kg is the volume / mass of water per second).

Energy needed to transport the same amount of water through uphill pipeline section(s) which in this case (Route # 1) is 262' (80 m):

EP = M x g x h = 2,882 kg x 9.81 x 80 m = 2,261,793.6 MWs in an hour it is <u>2.3 MWh</u>

Efficiency factor could be around 40% => 2.3 MWh x 1.4 = 3.22 MWh.

<u>Energy Net for Route # 1: 27.3 MWh – 3.2 MWh = 24 MWh</u>

The volume of outflow water is:

0.348 y^2 x 10 meter per second = 3.48 y^3 x (31,536,000 seconds in a year) = 109,745,280 y^3 ==> 68,023.93 acre-foot.

Rough estimate for energy needed to pump out and transport high salinity water from bottom of the lake and transport it into the Ocean - **Route # 2**:

Diameter of pipe is 24" = 2'

$A = \pi r^2$ = 3.14 x 1^2 = 3.14 f^2
3.14 f^2 / 9 = 0.348 y^2 = 0.2916 m^2

Mass = 0.2916 m^2 x 10 meter per second (estimated reasonable speed) = 2.9 m^3 =>

2.9 m^3 x (994 kg = weight of water at 100 ⁰F) = 2,882.6 kg

(2,882 kg is the volume / mass of water per second).

Energy needed to transport the same amount of water through uphill pipeline section(s) which in this case (Route # 2) is 1,600' (488 m):

488 meters + (70 meters Ocean to Lake difference) = 558 meters

On this route can be used 6 uphill pumping stations about 100 meters each.

EP = M x g x h = 2,882 kg x 9.81 x 100 m = 2,827,242 MWs in an hour it is 2.83 MWh

Efficiency factor could be around 40% => 2.83 MWh x 1.4 = 3.96 MWh.

3.96 MWh x 6 pumping stations = 23.76 MWh.

It is realistic to expect that outflow in downhill routes can generate 10% of energy used for uphill route which is 2.4 MWh.

Energy Net for outflow for Route # 2: 23.76 MWh – 2.4 MWh = 21.36 MWh

Rough estimate for energy needed to pump out and transport high salinity water from bottom of the lake and transport it into the Ocean - **Route # 3:**

Diameter of pipe is 24" = 2'

$A = \pi r^2$ = 3.14 x 1^2 = 3.14 f^2
3.14 f^2 / 9 = 0.348 y^2 = 0.2916 m^2

Mass = 0.2916 m^2 x 10 meter per second (estimated reasonable speed) = 2.9 m^3 =>

2.9 m^3 x (994 kg = weight of water at 100 ⁰F) = 2,882.6 kg

(2,882 kg is the volume / mass of water per second).

Energy needed to transport the same amount of water through uphill pipeline section(s) which in this case (Route # 3) is 2,700' (823 m):

823 m + (70 meters Ocean to Lake difference) = 893 meters

On this route can be used 9 uphill pumping stations about 100 meters each

EP = M x g x h = 2,882 kg x 9.81 x 100 m = 2,827,242 MWs in an hour it is 2.83 MWh

Efficiency factor could be around 40% => 2.83 MWh x 1.4 = 3.96 MWh.

3.96 MWh x 9 pumping stations = 35.64 MWh.

It is realistic to expect that outflow in downhill routes can generate 10% of energy used for uphill route which is 3.5 MWh.

Energy Net for outflow for Route # 3: 35.64 MWh – 3.5 MWh = 32.14 MWh

NOTE: This proposal is a preliminary design explaining the feasibility of the concept. The second stage would require collaboration with potential contractors and would contain more details, including more detailed cost estimate, which would follow with the final production design.

Summary of the Preliminary Analyzes of several Route options:

Route # 1 - Importing seawater from the Gulf of California – corridor: San Felipe - Mexicali, Mexico, - Salton Sea.

Elevation to overcome is 35 ‘ (10 m).
Pipeline distance is about 150 miles.
Cost estimate for pipeline: $1.7 billion
This route would produces power: 27.3 MWh

Route # 2 - Importing seawater from the Ocean – corridor: Oceanside - Temecula - San Jacinto - (existing tunnel) - Cabazon - Salton Sea.

Elevation to overcome is 1,600‘ (488 m).
2 cascades each with 279 m drop and 6 uphill pumping stations
Pipeline distance is about 160 miles.
Cost estimate for pipeline: $3.32 billion.
Energy needed for operation of the pipeline: 134.5 MWh.
For this route could be designate two (2) out of many planed geothermal power plants to generate power for importing water.

Route # 3 - Importing seawater from the Ocean – corridor: Oceanside - Temecula - San Jacinto - Beaumont – Salton Sea.

Elevation to overcome: 2,700‘ (823 m).
3 cascades each with 297 m drop and 9 uphill pumping stations.
Pipeline distance: about 170 miles.

Cost estimate for pipeline: $3.5 billion.
Energy needed for operation of the pipeline: 275.7 MWh.
For this route could be designate three (3) out of many planed geothermal power plants to generate power for importing water.

Route # 4 - Importing seawater from the Ocean – corridor: Oceanside - Temecula - Borrego - Springs –.Salton Sea.

Elevation to overcome is 3,600‘ (1,097 m).
4 cascades each with 292 m drop and 11 uphill pumping stations.
Pipeline distance: about 100 miles.
Cost estimate for pipeline: $2.2 2 billion.
Energy needed for operation of the pipeline: 380 MWh.
For this route could be designate four (4) out of many planed geothermal power plants to generate power for importing water.

Next Step:

Our next step is to inform professionals in the government, the energy industry, environment, academics, and more specifically geothermal professionals, about the existence of a new effective methodology for harnessing limitless geothermal energy.

Now that we have a feasible solution for harnessing geothermal energy and for the restoration of the Salton Sea, it is realistic to expect that the state and federal governments will get involved in financing at least the first phase of the project with a grant or long term loans, because the first phase by itself is not attractive to the private investors because it is not profitable as a separate project, but is an integral part and fundamental element in providing condition for involvement of private sector for the implementation of remaining and depending highly profitable phases of the project. The implementation of the project for the restoration of the Salton Sea and technology used, which can be used in many other locations and applications, is in interest to all of us - current and future generations.

Our mission at Geothermal Worldwide, Inc., is to license our IP – specifically: "Self Contained In-Ground Geothermal Generator (SCI-GGG); "Self Contained In-Ground Heat Exchanger" (SCI-GHE); “In-Line-Pump/Generator”; and “Apparatus for drilling deeper and wider well-bores” to the interested and capable parties worldwide and support the integration of its processes. All elements of this proposal are well documented (patented and some patent pending).

Geothermal Worldwide, Inc., Actively and Aggressively Enforces its Intellectual Property Rights to the Fullest Extent of the Law.