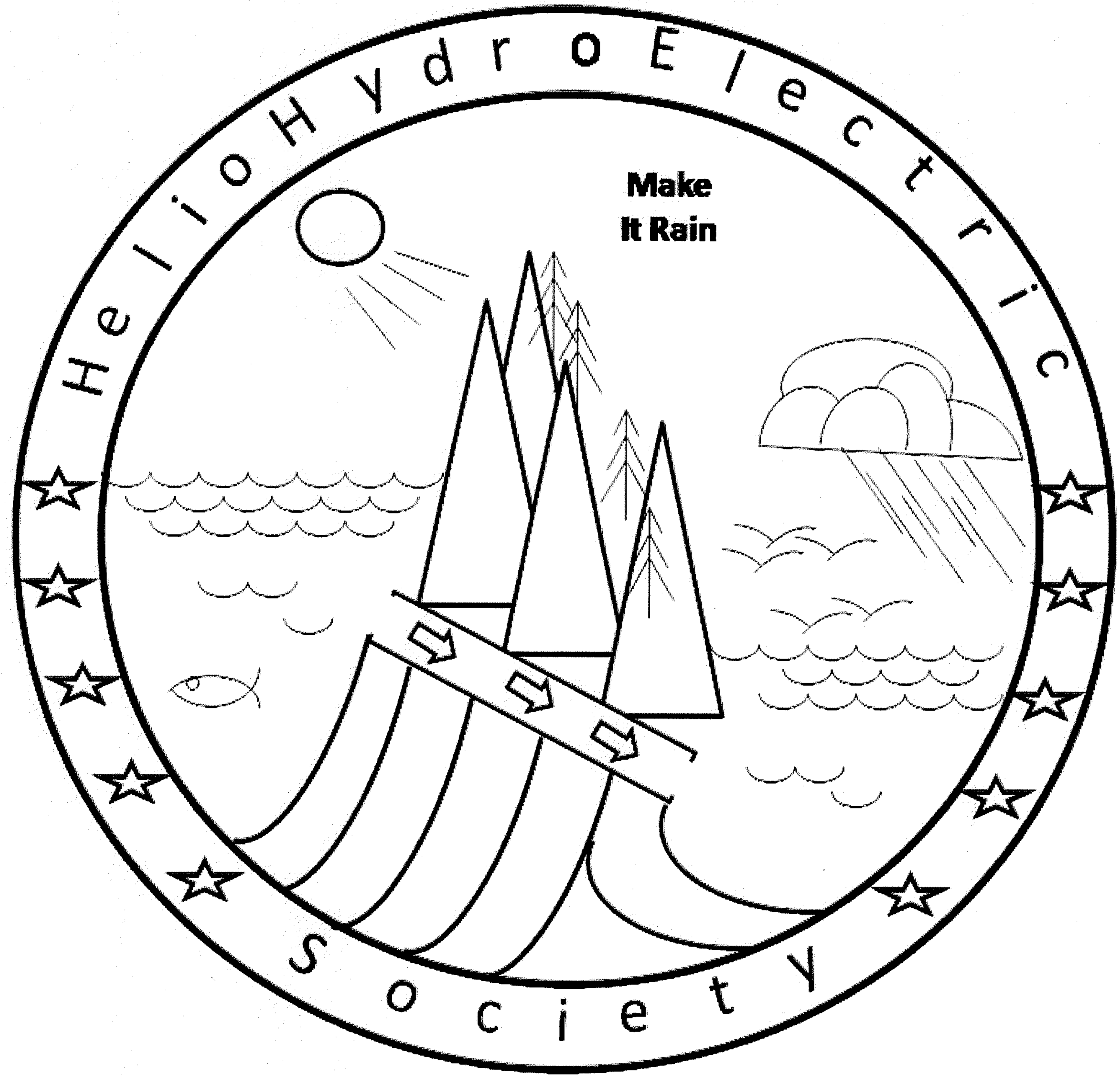
HelioHydroElectric
Society
Make
It Rain

HelioHydroElectric Potential
Prefeasibility Study
EXECUTIVE SUMMARY

Prepared by Martin Nix B.U.S, A.A.S. Seattle, WA, August, 2015

ABSTRACT: HelioHydroElectric is a little known solar engineering technology, using salt/sea water and solar power to create evaporation ponds for artificial rain in deserts. Worldwide there are large HelioHydroElectric resources. Located worldwide are dry endorheic salt lakes. These can be flooded with salt/sea water to create clouds from evaporation. The additional rainfall would increase vegetation, thus removing carbon dioxide from the atmosphere. HelioHydroElectric technology is the only technology that can actually remove carbon dioxide from the atmosphere. The additional rainfall in deserts will increase agriculture and provide new living space. Not only can salt/sea water be used, but also underground alkali aquifer water can be used to flood these dry salt lakes. It is proposed that wind and solar power be used, along with energy conservation, for water pumping. Development of HelioHydroElectric has the potential of solving the drought problem and reversing Global Warming worldwide. It is concluded that if fully developed worldwide, 281.1 cubic miles of rain water would be created each year, removing a total of 40,025,460,310 tons of CO2 per year. This is nearly equivalent to the amount of CO2 mankind generates each year. Plus, nearly 181,526,693 barrels of biofuel/biodiesel oil from algae grown in these lakes would be created. It is estimated that worldwide, 379,135 square miles of dry salt lakes could be flooded with salt/alkaline water. It is estimated that 363,482 Megawatts would be needed to pump this large volume of salt/alkaline water into deserts regions. This is well within the existing generation capacity of mankind. It is estimated there is approximately -5,368 Megawatts that can be generated from sites below sea level (such as the Dead Sea) worldwide. HelioHydroElectric would create an additional 1,494,763 square miles of grasslands in deserts. HelioHydroElectric can restore water in the Colorado River, thus solving the drought in California. The author utilized estimating techniques, in part due to the difficulty of obtaining current geologic data, much of it none existent. The author argues that much of the conflict in the Middle East is caused by the drought. HelioHydroElectric can be a military solution to the Islamic State. HelioHydroElectric will solve Global Warming. It is hoped this paper will spur conversations and funding for a full feasibility study.

WORLDWIDE POTENTIAL

Location	Potential Evaporation of Rain Water**		
	Cubic Feet/Day	Cubic Feet/Second	Cubic Miles/Year
Iran & Region	55,754,406,720	644,470	138.0
Pakistan & Region	3,170,901,280	36,660	7.8
India	2,787,840,000	32,266	6.9
Southwest USA	1,070,086,924	12,542	2.6
Middle East	7,193,343,091	87,785	17.8
Africa	11,413,225,680	132,073	28.2
South America	4,709,987,158	54,618	11.6
Australia	5,758,343,068	65,379	14.2
China/Mongolia	22,585,391,880	259,904	56.0
Worldwide Total:	114,443,555,800	1,325,697	283.1

**Assumes 1% evaporation rate per day per surface area.

WORLDWIDE POTENTIAL

Location **Energy Requirements for Pumping***

	Megawatts (Theory)	Megawatts (Practical)	Below Sea Level
Iran & Region	33,699MW	67,398MW	-3 ,596MW
Pakistan & Region	5,204	10,408	0
India	122	244	0
Southwest USA	4,807	9,614	-26
Middle East	10,277	20,554	-1025
Africa	32,803	65,606	-432
South America	29,941	59,882	0
Australia	4,140	8,280	-30
China/Mongolia	60,748	121,496	-259
Worldwide Total:	181,741MW	363,482MW	-5,368MW

**** Total square miles is an estimate. Geologic data was difficult to obtain, in some case did not exist. Author used a "best guess estimate" for square miles. Sometimes names did not exist, the author used local features for names.

***** Number of sites is actually unknown. However, a "best guess estimate" was used, when geologic data was absent. Not all sites can be developed due to wildlife, etc. However, some sites are very feasible. Attempt was made to locate dry salt lakes, which are flat and dry. (endorheic lakes)

WORLDWIDE POTENTIAL SURFACE AREA ESTIMATE

Location	Total Square Miles****	Number of Sites*****
Iran & Region	199,840	11
Pakistan & Region	12,545	11
India	10,000	1
Southwest USA	8,330	161
Middle East	19,301	88
Africa	38,403	54
South America	12,845	7
Australia	20,257	28
China/Mongolia	57,614	29
Worldwide Total:	**379,135**	**390**

**** Total square miles is an estimate. Geologic data was difficult to obtain, in some case did not exist. Author used a "best guess estimate" for square miles. Sometimes names did not exist; the author used local features for names.

***** Number of sites is actually unknown. However, a "best guess estimate" was used, when geologic data was absent. Not all sites can be developed due to wildlife, etc. However, some sites are very feasible. Attempt was made to locate dry salt lakes, which are flat and dry. (endorheic lakes)

WORLDWIDE POTENTIAL

ALGAE CARBON DIOXIDE REMOVAL POTENTIAL

Location	Total Square Miles	(Tons/day)	(Tons/year)
Iran & Region	199,840	27,856,097	10,167,475,510
Pakistan & Region	12,545	1,748,672	638,265,513
India	10,000	1,393,920	508,780,800
Southwest USA	8,330	1,161,135	423,814,406
Middle East	19,301	2,690,404	981,997,822
Africa	38,403	5,353,070	1,953,870,550
South America	12,845	1,790,490	653,528,850
Australia	20,257	2,823,663	1,030,636,995
China/Mongolia	57,614	8,030,930	2,931,289,450
Worldwide Total:	379,135	52,848,381	19,289,659,900

-Assumes 100 square feet of Algae grown removes 1 pound of CO_2 from the atmosphere per day.

-Total Square Miles x 5280ft x 5280ft = Total Square Feet.

-Total Square Feet/ 100 square feet per pound CO_2 removed / 2000 lbs per ton=

. Total Tons removed of CO_2 from atmosphere per day.

-Multiply by 365 to get amount removed per year.

WORLDWIDE POTENTIAL

Location	RAIN CARBON DIOXIDE REMOVAL POTENTIAL		
	Evaporation Rate/Year Cubic Miles	Square Miles Grasslands Created	Tons/Year CO2 Removed
Iran & Region	138.0	728,640	10,156,658,690
Pakistan & Region	7.8	41,184	574,072,012
India	6.9	36,432	507,832,934
Southwest USA	2.6	13,728	191,357,337
Middle East	17.8	93,984	1,310,061,773
Africa	28.2	148,891	2,075,421,427
South America	11.6	61,248	853,748,121
Australia	14.2	74,976	1,045,105,459
China/Mongolia	56.0	295,680	4,121,542,656
Worldwide Total:	283.1	1,494,763	20,735,800,410

-Assume 1 square foot of grassland removes 1 pound of CO2 per year.
-Assume one cubic mile of rain per year creates 5280 square miles of grass lands.
-Square miles grasslands created x 5280 ft x 5280 /2000 lbs per ton=Total/Year CO2 removed.
-Assume 12 inches of artificial rain created by HelioHydroElectric creates one pound of grass in grasslands per square foot.
-The MicroClimate effect adds additional rainfall, thus the amount of rainfall should be greater than 12 inches per year.

TOTAL CARBON DIOXIDE REMOVED PER YEAR BY HelioHydroElectric

19,289,659,900 + 20,735,800,410= 40,025,460,310 Tons/Year

Mankind generates 39,800,000,000 Tons/Year of Carbon Dioxide.

HelioHydroElectric if fully developed worldwide would remove all the CO2 created by Mankind.

WORLDWIDE POTENTIAL

Location	**ALGAE BIOFUEL/BIODIESEL POTENTIAL**	
	Tons/day	**Barrels/Day**
Iran & Region	**27,856,097**	**98,315,636**
Pakistan & Region	**1,748,672**	**6,171,783**
India	**1,393,920**	**4,919,717**
Southwest USA	**1,161,135**	**4,098,123**
Middle East	**2,690,404**	**9,495,543**
Africa	**5,353,070**	**18,893,188**
South America	**1,790,490**	**6,319,376**
Australia	**2,823,663**	**9,965,869**
China/Mongolia	**8,030,930**	**23,344,458**
Worldwide Total:	**52,848,381**	**181,526,693**

-Assume that one pound of CO2 makes 1/3 equal weight in Biofuel/Biodiesel.
-Assume 30% efficiency of process.
-Assume one barrel of oil weighs 170 pounds.
-Convert one ton to 2,000 pounds.
- Tons/day x 2,000 pounds per ton / 170 pounds per barrel of oil x 30% efficiency=Barrels/Day of Biofuel/Biodiesel fuel made.

HelioHydroElectric can potentially make 181,526,693 Barrels of oil per day.

Conclusion: Proposed is the pumping of salt/seawater inland to various endroheic dry lakes for flooding of existing dry salt lakes to create clouds, and thus artificial rain. This technology, known as HelioHydroElectric technology, will create more vegetation in the desert, region and in mountains, thus reversing Global Warming. It will stimulate the economy of the world, and help solve many conflicts worldwide caused by lack of water and drought. Solar pumping technology is now very well developed. This Prefeasibility study is mostly to study the potential for construction of such a project. It is hoped that funding for a complete Feasibility study can be located so as to determine the environmental impact, climate impact, and economic impact along with construction plans and cost. Israel, Jordan and Palestine are presently constructing the Red to Dead Sea project, so as to add additional moisture to the region. Egypt has under study the Qattara Depression project. This is being reviewed elsewhere. Iran and Pakistan are considering HelioHydroElectric projects. It is proposed that these sites be evaluated for future development.

This is no visionary than what TVA and Hoover Dam were in 1915, history repeats itself.

"Global Warming Solution"

HelioHydroElectricTechnology

TALKING POINTS

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WHAT IS HELIOHYDROELECTRIC? In its simplest definition, it is the use of salt/seawater and solar energy to create electrical power. There are four methods of HelioHydroElectric.

METHOD ONE: There are numerous locations worldwide which are below sea level. By building a pipeline from the nearest ocean, inland seawater flows downhill, flooding these basins below sea level, and generating electrical power. Many of these areas below sea level are in deserts.

METHOD TWO: By using solar and wind power pumps, seawater can be pumped inland to flood existing dry salt lakes in deserts.

METHOD THREE: There are huge salt/alkaline aquifers deep underground. By using solar and wind power pumps, this salt/alkaline water can be pumped to the surface to flood dry salt lakes in deserts.

METHOD FOUR: By building a dam across a bay, sea water flows into the lake. The evaporation of the water from sunlight makes the density of the seawater heavier, which then flows back to sea with higher salt density, thus creating electrical power.

WHY HELIOHYDROELECTRIC POWER? This is the only technology that can potentially remove carbon dioxide from the atmosphere. Most of the other solutions focus on reducing carbon dioxide emissions. <u>This technology will solve Global Warming</u>.

HOW DOES HELIOHYDROELECTRIC WORK? 1) Flood existing dry salt lakes in deserts with salt/seawater, creating evaporation ponds. 2) Solar energy from the sun falls upon these artificial lakes, creating clouds. 3) These clouds cool the desert with shade, reflecting heat back to outer space. 4) These clouds then travel to nearby mountains, creating rain. 5) The rain falls in mountains creating vegetation. 6) The vegetation grows, absorbing carbon dioxide from the atmosphere, thus reversing "desertification". 7) The additional rainfall puts more water into existing (and sometimes new) hydro dams <u>creating electrical power</u>.[1]

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[1] Kettani, M. HelioHydroElectric (HHE) Power Generation Dec 1972. IAEA/INIS

THE VISION: Creating evaporation ponds of salt/seawater in deserts can be done worldwide; including the Western United States, Australia, Western China, Mexico, South Africa, the Middle East and the Sahara. By the author's estimates, 50% of the HelioHydroElectric potential is in the Sahara desert. This is no more visionary than Hoover Dam or the Tennessee Valley Authority was in the 1920s, during the Great Depression in the United States. The difference is the vision is Global.[2] This is a worldwide hydroelectric project utilizing salt water and solar energy.[3]

CASE STUDY, ISRAEL: Israel, Palestine, and Jordan are jointly building two pipelines from the Red Sea to the Dead Sea. One pipeline will go on the Jordan side, the other on the Israel side. As the seawater flows downhill, electrical power is generated. The Dead Sea is going dry. As a result the underground aquifer in the area is lowering, which is increasing the amount of sinkholes in the area. It is hoped that it will lend stability to the local geology. The additional seawater from the Red Sea will increase cloud cover and local rainfall. Please note, Palestine is involved. It is amazing these three are cooperating.[4]

CASE STUDY, EGYPT: The Qattara Depression in Egypt has been extensively studied.[5] The plan is to build pipelines from the Mediterranean Sea to an approximately 5,570 square mile area below sea level inside Egypt, flooding the area with seawater. The solar energy from the sun evaporates the water, creating artificial rain along with electrical power.[6] An added bonus, it will help remove pollution from the Mediterranean Sea.[7]

CASE STUDY, SALTON SEA: This is actually a manmade lake in Southern California, and it is polluted. In fact, this is the only place in the United States where polluted water flows into the country. The additional seawater to the Salton Sea may help clean up the pollution, and add local moisture and rainfall. Furthermore, the electrical power can be used to flood nearby basins with salt water; thus helping to alleviate the drought in California. California only has about one year of fresh water left. The present plan is to use the "desalination method"; which takes seawater, removes the salt, and makes it fresh. The desalination method creates waste and is very expensive. Also, the desalination method does not solve the problem at hand: the serious drought the state is experiencing. HelioHydroElectric can do what the desalination method cannot do. It is unknown if the engineering design work has been proposed.

CASE STUDY, ARIZONA: Lake Mead in Arizona and Nevada is going dry, and the lake is at its lowest level in decades, at almost 150 ft. below capacity.[8] This has created a severe problem with the seven states as part of the Interstate Compact. Solution: flood the several thousand or

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[2] A good book to read of the era is Hiltzik, M., Colossus: Making of the American Century.
[3] Nix, M. U.S.Patent Application US20080131830 Use of Renewable Energy. HelioHydroElectric

[4] According to the Global Nature Fund, and World Bank, the project will cost 11.1 to 11.3 U.S. Dollars
[5] Simon,A. Energy Resources. Page 101. 2013 Pergamon
[6] Hafemeister,D. Physics of Societal Issues: Calculations on National Security, Environment,& Energy. Pg 441, 2014.
[7] Wikipedia. Qattara Depression.
[8] National Oceanic Atmospheric Administration

so dry salt lake basins in the Western United States with salt water.[9] Few know this but underneath the American West is a huge salt water aquifer. It is so big you can actually float a submarine from Arizona to Nevada. Fresh water floats on top. This aquifer is theorized to be tied to the ocean, so pumping salt/alkaline water out will never lower it. By using Method 3, this salt/alkaline water can be pumped to the surface to flood basins, like the Booneville Salt Flats in Utah, to create artificial rain in the American West. This puts water into the Rio Grande and Colorado. This is something the Interstate Compact states (NM,AZ,UT,CO,NV,WY,CA) should seriously discuss. To date, the engineering for HelioHydroElectric for the Western states has not been reviewed.

CASE STUDY, AUSTRALIA: Australia is in the middle of a huge record breaking heat. Wildlife is suffering. Western Australia has a large number of dry salt lakes and on occasion, a typhoon will come through and fill up these dry salt lakes with fresh rain water. The desert instantly becomes alive. The idea is to use Method 2 and pump sea water inland and flood these dry lakes, so they have water year round. Australia has one area that is below sea level. The idea is to build a network of pipes throughout Western Australia, pumping seawater to these dry lakes for evaporation. Australia does have underground salt water aquifers that could be tapped using Method 3.[10] Unfortunately the present Australian Prime Minister is a climate change denier.[11] It is unknown if the engineering design work has been proposed.

CASE STUDY, ERITREA AND ETHIOPIA: Located inland, in Ethiopia, is the Afar Basin; and inside is the Danakil Depression.[12] Today, caravans of camels trek to the center to mine rock salt for resell. Ethiopia has had internal social unrest, due to privatization of water sources. Eritrea has had a lot of human rights violations. Both nations have been at war. [13] A large part of the conflict is water. A project like this just might help the two nations achieve peace, while providing additional water and electrical power. It should be noted that this area has significant archeological discoveries. About 2 to 2.5 million years ago during the Pliocene period, ancient species of Homo sapiens lived here, and effort will be needed to protect these sites. (Morin, M., Jaw Fossil Shakes Up Humans Family Tree, Los Angeles Times, TNS, March 5, 2015) It is proposed that two pipelines pipe seawater inland from the Indian Ocean, one for Eritrea and one for Ethiopia. It is unknown if the engineering design has been proposed.

CASE STUDY, DJOUBOTI: In the middle of this tiny nation, is a depression area below sea level, Lake Assal.[14] In fact the ocean is already attempting to cut through the volcanic formations. Over time, this area will naturally become an inland salt lake. Lake Assal is a 350 square mile area and is 500 ft. below sea level. Djibouti can harvest this energy, and power the entire nation via HelioHydroElectric. It is unknown if the engineering design has been proposed.

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[9] Wikipedia. Dry Lakes USA
[10] Wikipedia. Dry Lakes Australia
[11] Guardian. What Does ... Tony Abbot Really Think About Climate Change. 2014
[12] Wikipedia. Danakil Depression
[13] From conversations with people from the region
[14] Wikipedia. Lake Assal

CASE STUDY, IRAN: It has not rained for nearly a year in Iran. The nation is deeply concerned, and HelioHydroElectric is being discussed by the highest levels of government. The author has requested that Secretary of State John Kerry discuss this as part of the present negotiations with Iran and the United States. The author contends that if Iran is to build these HelioHydroElectric projects, they will need help from the United States. Iran has four major basins in the Southern part of the nation that could be flooded using Method 2. Three of the basins are approximately 1,500 ft. high in altitude, one is approximately 3,000 ft. This will require huge amounts of solar and wind energy to pump this volume of seawater uphill. There is an area, however, below sea level in Iran: the Caspian Sea. The Caspian Sea is going dry. By building a huge pipeline from the Indian Ocean to the Caspian Sea, electrical power would be generated, perhaps enough to pump seawater uphill to the four dry basins. (One basin borders Afghanistan). Iran has strict environmental laws, so construction of these HelioHydroElectric projects will need to comply. This may not be such an impossible task. Underneath Iran are large aquifers. By connecting these aquifers with tunnels, it may be possible to create a flow of seawater inland to the Caspian Sea.[15] Flooding the Caspian Sea will also create additional cloud cover and rainfall for Southern Asia. The Ural Sea is now officially dry.[16] This may actually create enough rainfall to put water in the Ural Sea. An alternative route for flooding the Caspian Sea is via Chechnya in Russia. The author would like to negotiate an "oil for solar" trade agreement between Washington State and Iran. Detail studies have not been done, however, Iran is definitely taking an interest in HelioHydroElectric technology.[17]

CASE STUDY, CHINA: Western China is again, in a drought. So much so, there has been an ethnic conflict; the author would say over lack of water. China is aware and is looking at a mega project to pipe water from Southern China, where water is plentiful, to Western China, where there is in a drought. Granted, this is the diversion of fresh water. The import of large amounts of river water into Western China will have a major impact on the climate. It is known as the China South to North Water Diversion Project. The evaporation of so much irrigation water should increase vegetation in the region.

OTHER LOCATONS: By no means is this an inclusive list of all potential locations. There use to be an ancient river system in Western Egypt, Libya, Tunisia, Algeria, Niger, Mali, South Africa, Mexico and even Saudi Arabia[18]. There use to be numerous lakes in the Sahara desert.[19] Geologists have found whale bones in the middle of the Sahara. A pod of whales got stranded when the land went dry. It is known as the Wadi Al-Hitan. These areas, however, can be again flooded, to stimulate the economy of many of these desert nations. There will be impacts as the land subsides, due to the weight of the water and salt. There will be earthquakes.[20] The

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[15] Wikipedia. Caspian Sea
[16] Wikipedia. Ural Sea
[17] Based on conversations by the author with Iranian citizens.
[18] Dawhat Salwah, Saudi Arabia
[19] Lamb, H. Climatic History and the Future, Evidence of Past Weather and Climate. 1985
[20] Wikipedia. Land Subsidence

author does not believe that all potential sites have been inventoried, but can be done.[21] There is hope.

WHAT ABOUT THE SALT? Over a period of centuries HelioHydroElectric will remove salt, pollution and radiation from the ocean. By trapping the pollution and radiation geologically, the ocean will become cleaner and less acidic. The acidity of the ocean has reached dangerous levels due to climate change; this puts our coral reefs, and the balance of the oceans ecosystem, in jeopardy. According to the U.S. Geologic Survey, the ocean has nearly 321,003,271 million cubic miles of salt water in it. The ocean contains approximately 96% of the world's water. There is estimated to be 332,519,000 cubic miles of water worldwide. 2% is locked up by glaciers and ice caps. Only 1% of the world's water is fresh. By salt content, the salt density in the ocean varies depending on location. According to the Office of Naval Research, "the average ocean salinity is 35ppt (ppt=parts per thousand)...This number varies by 32 and 37ppt". So there is a lot of salt in the ocean. With development of HelioHydroElectric, this salt will be pumped inland, forming natural geologic salt formations, thus entombing radiation and pollution geologically. These HelioHydroElectric projects will eventually "silt" up with salt, but it will take centuries. Still the volume of these dry lakes is huge, and can accumulate huge amounts of salt. Method 4 could be used to flush salt brine back to the ocean, thus extending the life span of evaporation ponds. According to Palomar College, "some scientist estimate that the oceans contain as much as 50 quadrillion tons of dissolved solids. If the salt in the sea could be removed and spread evenly over the Earth's land surface it would form a layer more than 500 ft. thick, about the height of a 40 story building".

POTENTIAL FOR RARE METAL MINING: This salt also has another bonus; as there are rare metals in these salts that can be mined via electrolysis or magnetic separation. (Bardi, U., Extracting Minerals from Sea Water, Sustainability, April 2010) According to Stanford University, seawater contains Magnesium 1272 ppm, Strontium 13 ppm, Copper .09 ppm, Selenium .004 ppm, Gallium .0005 ppm, Gold .000008 ppm. (ppm=parts per million). Some of these rare metals go for $400,000 a pound. There is a huge economic potential, helping to finance HelioHydroElectric.

WHY NOT NUCLEAR POWER? Solar and wind technology can be made quicker and cheaper. Nuclear power plants bring physical and environmental dangers.[22] The author doesn't think we have the energy density from nuclear power to even do it. Bringing in nuclear power to pump seawater inland for nations like Somalia, Libya, Syria, Egypt, and Eritrea may not be ideal; these are war zones. It was once discussed to use nuclear weapons to build the Qattara Project.[23] The proposal was rejected. Using nuclear power for pumping seawater for HelioHydroElectric is a No Go.

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[21] Scientific American, Battling Drought: The Science of Water Management. 2012
[22] Phil Niklaus wrote articles exposing the danger of a nuclear meltdown in the Albuquerque Journal 1975
[23] Wikipedia. Qattara Depression

HOW DOES SOLAR AND WIND POWER WATER PUMPS WORK? In the 1800s, in the American West, wind turbines were very common, pumping water to the surface. Today, advancements in technology have brought about more efficient wind turbines. The use of solar energy is a new potential. One method is to use solar photovoltaic cells to generate electrical power for a DC powered pump. Another method is to heat a heat transfer fluid, like hot oils, and then drive a steam turbine. New is solar thermal technology, where a mass is melted to a hot liquid, then at night, the heated mass (such as melted salt) makes steam for a turbine. These would work for Method 2 and 3. Method 1 is unique in that areas below sea level are flooded with seawater. As seawater flows downhill, it creates electrical power. Thus from Method 1, electrical power then can be used to pump more seawater uphill; flooding areas above sea level for evaporation. It is unknown the exact amount of electrical or mechanical power needed to pump this large volume of salt water, but the number is huge.[24] Solar and wind water pumping technology is well worked out.

HOW DOES WEATHER WORK? Think of weather as being your refrigerator, except the sun is the electricity. Your refrigerator has two ends; it has a hot end, and a cold end. When the thermostat is turned up, the refrigerator gets colder inside. The condenser coil outside gets hotter. The refrigerator is throwing heat out. This is why Boston air gets colder in the winter and California gets hotter. The additional heat from the sun squeezes the air, much like a refrigerator. When hot moisture laden air is squeezed, like a compressor, the heat leaves and the moisture steams. When air is expanded, the air gets colder. This is the reason for the extremes of temperatures, and why weather is getting wilder. There is more heat from the sun being trapped. With HelioHydroElectric there is a Micro Climate impact, where once rain water starts, the rain water circulates locally.[25] For example, there is a morning fog that creates moisture for plants. There is a Macro Climate impact where rain water escapes to the rest of the world. Rain water will circulate locally, thus creating more vegetation.

BRIEF GEOLOGIC TIMELINE OF CLIMATE CHANGE: The Earth has gone through several major extinctions, caused by an ever-changing climate. It is believed the Earth has been entirely frozen once, if not multiple times. This is known as the Snow Ball Earth Hypothesis.[26] The most recent one was about 600 million years ago. It is believed volcanic eruptions emitted carbon dioxide into the Earth's oceans and atmosphere, warming the planet; taking it out of this Snow Ball state. [27] It is believed this is what triggered the Cambrian Explosion, resulting in multicellular life. In the past 2 million years, Earth has undergone many glacial and interglacial periods. The main factor behind these global changes is believed to be "orbital forcing".[28] There are changes in the Earth's axial tilt and orbital eccentricity around the sun, which have forced climatic changes throughout Earth's history. This is a cycle and can be correlated to major changes in Earth's climate. We have been able to use ice cores to look back on how the climate

[24] Good Source of Information is Solar Thermal Magazine
[25] www.freedictionary.com
[26] Wikipedia. Snow Ball Earth Hypothesis
[27] Algae Industry Magazine
[28] Encyclopedia Britannica

has changed through time. Carbon dioxide is trapped in bubbles in the ice record. This gives us the ability to see how the concentration of carbon dioxide in our atmosphere has changed throughout time. Between interglacial and glacial periods, there is a difference of about 100ppm (ppm=parts per million). Due to human influence, however, the concentration in our atmosphere has been driven up by 200ppm since the last glacial period. Carbon dioxide concentration was stable for some time, and then started to rapidly rise in the early 19th century, around the time of the Industrial Revolution.[29] There are a lot of causes as to why climate change happens; dust in the atmosphere, radiation from other stars, ozone, volcanoes, meteorites, hydrogen clouds from outer space, sun's variability, the ocean's currents, and the earth's orbital variations. Today we live in an interglacial period. Mankind's contribution is now a major factor.

IMPACT ON MANKIND FROM OCEAN LEVEL CHANGE: Throughout geologic time the ocean's levels have risen and fallen. In fact, the Mediterranean Sea, Black Sea, and Persian Gulf were dry land in geologic time. It is theorized that the advancement of glaciers help mankind discover fire. There are entire ancient cities flooded off coasts that were flooded by rising sea levels. The rising and lowering of the sea levels has had major impact upon mankind's development. Over geologic time ocean levels do rise and fall. [30] [31] [32] [33] [34] [35]

IMPACT OF HELIOHYDROELECTRIC ON OCEAN LEVELS: With HelioHydroElectric development it will put more rain water on land, refilling underground aquifers. Additional water will be locked up in plants. More snow will fall on mountains, making the glaciers larger. It will put more fresh water into surrounding rivers and lakes during the warmer seasons. There will be more snow on the Arctic, restoring the ice shelf. There will be more fresh water flowing into the oceans, helping to balance the acidity. By the author's estimate, there must be close to 100,000 locations worldwide where HelioHydroElectric can successful. The exact number is unknown. The additional fresh rain water would put more fresh water from rivers into the ocean, thus helping to reverse acidification. By using guess-a-math it is estimated that if 500,000 square miles of surface land area was flooded with salt water, it would put at least 10 cubic miles per day of fresh rainfall in desert regions, potentially vegetating close to maybe 500,000 to one million square miles of desert land area. To accurately determine the exact amount and location, however, this would require a computer simulation. Several computer models of the world climate have been developed, which can be utilized.[36] The net result is HelioHydroElectric will help lower the sea level.

[29] British Antarctic Survey. Ice Cores and Climate Change.CO2 and CH4 over last 1,000 years.
[30] Ryan & Pitman. Noah's Flood: The New Scientific Discoveries About the Event that Change History
[31] Yanko-Hombach.Black Sea Flood Question of 5800 BC
[32] Hamblin. Has the Garden of Eden Been Located at Last? Saudi Archeology
[33] Wikipedia. Control of Fire by Early Humans
[34] A interesting discussion of underwater ancient cities is at Underwater Archeology Magazine
[35] A good discussion of ocean levels is in Lamb, H. Climatic History and the Future. 1985. Page 342.
[36] World Meteorological Organization

WHAT ABOUT VOLCANOES? If it was not for volcanoes, the Earth's atmosphere would not exist. Volcanoes put gases into the atmosphere, including dust and carbon dioxide.[37] They do, also, release aerosols into the stratosphere which lower temperature. Aerosols, however, are removed after a few years; carbon dioxide sticks around for much longer. Mankind can't do much about controlling the release of gases from volcanoes. However, this is a fact. HelioHydroElectric can remove carbon dioxide from manmade sources like coal power plants or automobiles. HelioHydroElectric can also remove carbon dioxide from natural sources like volcanoes.

HISTORY REPEATS ITSELF: HelioHydroElectric is no more visionary that Tennessee Valley Authority was in the 1930s. A little history. The United States was in a deep depression, caused by the excess of the 1920s. Tennessee was so bare that it looked like New Mexico. Rivers flowed with mud. Poverty was rampant. Roosevelt was elected, and via public financing, i.e. Revenue Bonds, he ordered the construction of huge hydroelectric projects nationwide. This led to the creation of Public Power, which drove Private Power companies insane. The difference being the Private Power companies are owned by stock holders, while the Public Power companies are owned by the rate payer. Whatever, the development of hydropower in the 1930s brought the nation out of a severe economic depression. Contrary to popular opinion, it was not World War II; it was the development of a new cheap energy source that pulled the nation out. Solar energy follows much of the same economics of hydropower. Back in the 1930s the Oklahoma Dust bowl was so severe that it snowed dirt in Washington DC.[38] Today we call it the Sahara Desert, that is our dust bowl of the century.[39] Just as we solved the dust bowl of Oklahoma, we can solve the dust bowl called the Sahara desert.

GLOBAL WARMING AND THE ISLAMIC STATE: The author contends that the major root cause of the Islamic State is Global Warming. It is directly related to the lack of rain water. The drought in the region is the major reason for these conflicts. The author has been told that this is official state policy of Iran. Syria is indeed in an intense drought. Farmers have been driven off their land, and are invading their weaker neighbors, forcibly obtaining their lands and water. Note how the word "war" and "wa(te)r" are related. (Borenstein, S. Climate Change, Drought Cited for Role in Syria's War. Associated Press, March 3, 2015). The fact is there are too many people for the carrying capacity of the land. We have an entire region with a matrix of warring groups; with so many groups we cannot keep track of them all. This entire region is committing mass suicide over one thing: lack of water. Solution: make it rain.

RAIN AND CONTAIN: The author contends that a "military solution" to the Islamic State isn't feasible. Military action, however, can help contain and support humanitarian aid for those who are affected. In short, military action will only contain, not eliminate the Islamic State. If the root cause of the Islamic State is the drought caused by Global Warming, then the solution is to attack the root cause. The author has requested that President Obama order the Army Corps of

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[37] Environmental Geology. Annual Volcanic Carbon Dioxide Emissions
[38] Wikipedia. Dust Bowl
[39] Numerous history books exist on the Economic Depression Era. Ref: TVA: New Deal to a New Century.

Engineers to review HelioHydroElectric as a military strategy. It's not coincidental that most HelioHydroElectric projects are also in war zones. Judging from the recent remarks from the Joint Chief of Staff, the author believes they are taking this serious. There should NOT be a Declaration of War on the Islamic State. Instead do a Declaration of War on Global Warming. The Islamic State is purely a symptom of Global Warming.

IMPACT ON MILITARY SPENDING: By redirecting this War on the Islamic State to instead a War on Global Warming, this will have major implications on military spending. F-35 jet fighters are totally ineffective against Global Warming hurricanes. It is predicted by the Joint Chief of Staff that increasingly humanitarian aid from Global Warming disaster will consume more and more of military time and budget. This means that instead of spending money on a new "stealth bomber", the military should develop a new bomber that has a new mission: dropping humanitarian aid on those areas affected by Global Warming. It means that more money will have to be allocated to the Army Corps of Engineers. It means more money spent on the airlift command, to transport solar equipment inland to pump seawater. The author believes "terrorism" is an act of desperation done by desperate people. The real war should be directed at the cause of war. HelioHydroElectric has that potential to eliminate severe poverty and attack the root cause of terrorism. HelioHydroElectric would employ an entire planet, just like Hoover Dam did in the 1930s for a nation. This would pull everyone together to a common goal. We need to redirect more military aid away from "nation vs. nation" and instead direct it to the real national security threat: Global Warming.[40]

THIS WILL REQUIRE INTERNATIONAL COOPERATION. There is no way the United States alone can do this. Bluntly we will need Russian help, along with China and Europe. This situation in Ukraine is so distracting. Ukraine is civilized compared to the Islamic State. Crimea has had a long history of involvement with Russia, dating back to the Roman times. Ukraine is to Moscow what New York is to Florida. It is cold in Moscow, warm in Ukraine. There is hope for a diplomatic solution, as said, Ballots not Bombs. But there is one other reason for being optimistic about Ukraine: IT RAINS IN UKRAINE. It does not rain in Syria. Somehow water tends to calm people down. This conflict with Russia is like setting fire in our house. Russia did help build the Aswan Dam in Egypt.[41] Russia can help build the Qattara. Russia and the United States did cooperate during WWII. History can again repeat itself.[42] We are going to need international cooperation.

COST OF CONSTRUCTION? We do not have the industrial capacity to build such a huge worldwide hydroelectric project. It simply does not make "cents" to burn coal to make the large number of solar pumps and pipelines to build it. It can be done if we adopt "breeder" concepts, where solar energy is used to make solar energy equipment. It could be done. Method 1 would be the first choice. Use the energy from Method 1 to power the factories to make the equipment for Method 2 and Method 3. The first projects to be built would finance industrial

[40] A good source of information is the Center for Defense Information, Washington DC
[41] Wikipedia. Aswan Dam
[42] Wikipedia. History WWII Ukraine

parks, which then would make the equipment for other HelioHydroElectric projects. We can phase this in.

BIOFUELS: HelioHydroElectric technology has another gift, algae. These salt lakes grow algae, which can be converted to biodiesel fuels. The airline industry has formed a consortium to explore making airline fuels from biological sources.[43] Contrary to the propaganda, the intent is NOT to use food source plants like soybeans. The effort is to use salt water, polluted water, brown lands (i.e. converted garbage dumps, previous coal strip mines and deserts) to grow these biofuel crops. There is active research and development work to use salt water. Biofuels is a field that is creative and exciting.

WHY DOES NOONE KNOW OF HELIOHYDROELECTRIC? It could be deliberate. A partial answer may be this. Years ago the inventor of the biodiesel fuel formula, Expedito Parente, came to visit the author in Seattle. He is the patented inventor of the chemical process to convert algae and other biofeed stock to be diesel fuel.[44] In 1980, the biodiesel conversion patent was stamped Classified. This explained a lot. When the author was at the New Mexico Solar Institute at NMSU, the author can attest to the negative attitudes of the then Reagan Administration towards growing algae for fuel in the New Mexico desert using underground salt waters. These HelioHydroElectric projects will grow huge amounts of algae making enough biodiesel fuel to replace the need for mineral oil altogether. This is a huge energy source that would largely decrease the need for fossil fuels. Most foreign military arms sells are financed one way or the other via oil and fossil fuel revenues. Bluntly, vested interest does not want it discussed. Governor Jay Inslee, Congressman Adam Smith, President Obama and Hillary Clinton and Senator Patty Murray are aware, but so far have not been public. Suspect the reason is to buy time for the analysis to be done. So, let's talk about it.

NEXT STEP? Write a book. There is not very much information available about the topic. Google the term HelioHydroElectric. This is known solar engineering. We propose hiring 10 university student internships, and write the book within 10 weeks. Since we don't believe in intellectual slave labor, pay each of these interns $1,000 a week, and share 1% of the royalties. This crew should be heavy on the technical side, geology, climatology, mechanical engineering, planning/architecture, civil engineering, economics, and since this involves military strategy, military science, economics and foreign relations. Hopefully this book will stimulate university research of the topic. If well researched, referenced with footnotes, and well written, this could be on the New York Times best seller list. The author cost the project to about $400,000 to $500,000 dollars, but the return on sells could be more. Writing a book is one sure way to educate the public.

AFTERTHOUGHTS: Without water, we would not exist. Within a few years, the global population will near ten billion people. The carrying capacity for the planet is being overtaxed.

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[43] Algal Biomass Organization, formed 2008
[44] Interview: Expedito Parente. dc.itamaraty.gov.br

With the development of HelioHydroElecctric we have the potential of putting a stop to this "perpetual warfare" on planet Earth. We can rise above this.

We were placed on this planet to protect and cherish Planet Earth. It is our duty and obligation to do so. Speak up, let people know of this option,VOTE. Get people in political office, and major corporations, to support rapid development of HelioHydroElectric.

We hereby call for introduction in the U.S. Congress:
The HelioHydroElectric Development Act.

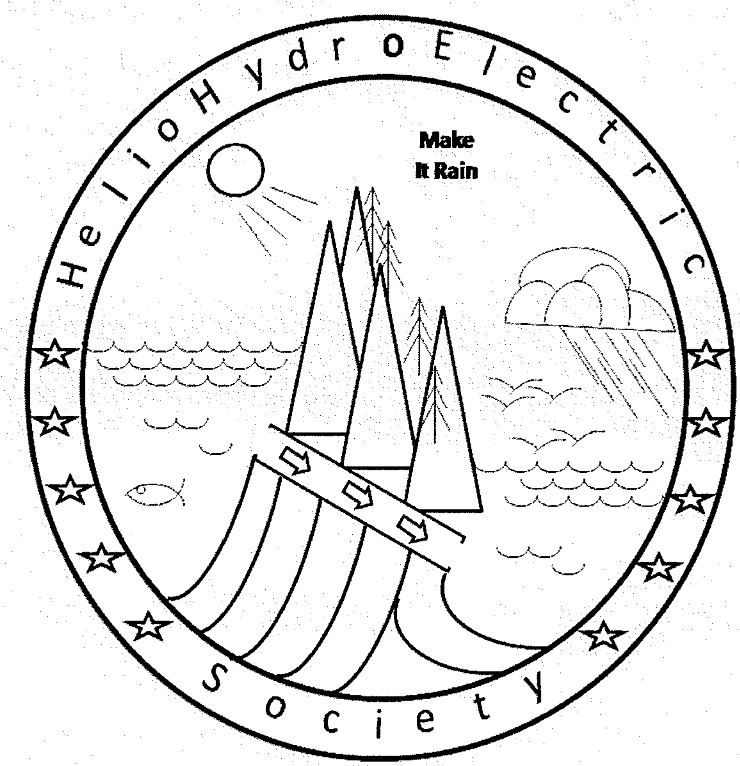
WHO IS MARTIN NIX? Martin Nix is founding secretary for Solar Washington, a not for profit organization dedicated to developing solar technology in Washington state. He is the patented inventor of ten patents in solar technology, including solar cooking, and solar smelter technology. He attended the School of Regional Planning and Architecture at UNM, and attended the School of Engineering at NMSU. He is a graduate of UNM, North Seattle Community College and Seattle Central Community College. B.U.S., A.A.S., C.A.

WHO IS CHERYL DUKE? Cheryl Duke is a recent college graduate from Florida State University, where she earned her B.S. in Geological Sciences with a minor in Mathematics. While attending she focused on hydrogeology and geochemistry. She worked as an intern and lab technician for almost two years at the Florida Geological Survey. B.S.

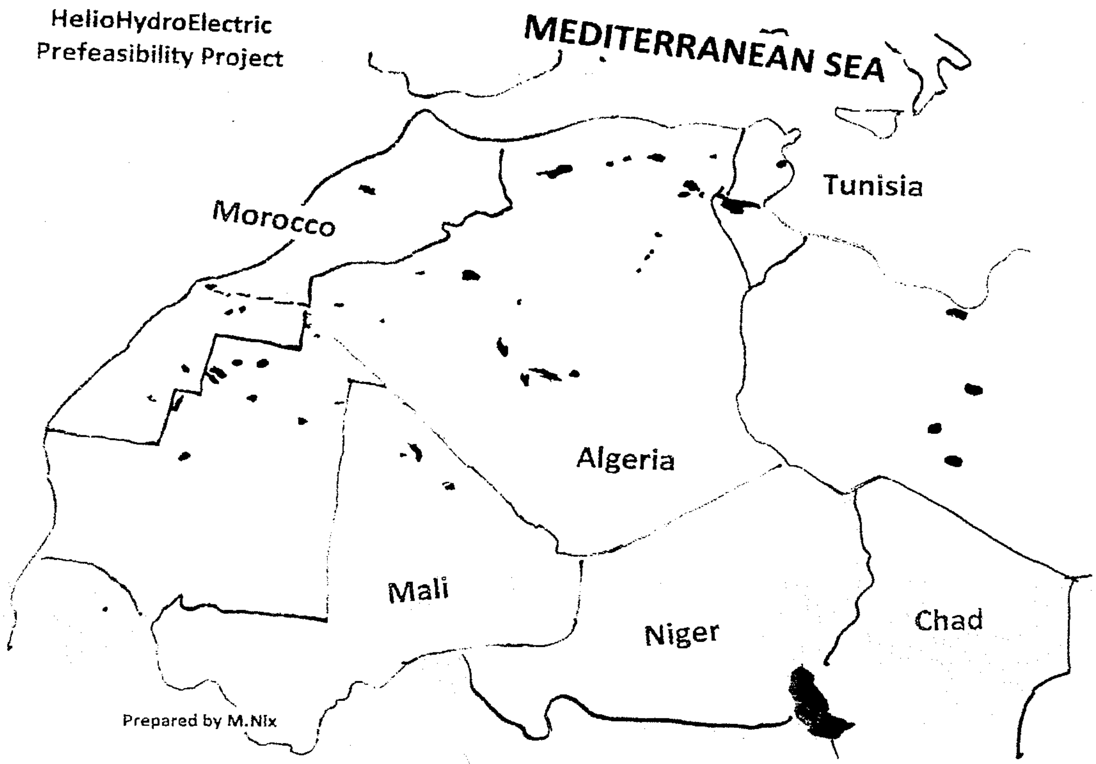
HelioHydroElectric Potential
Prefeasibility Study
AFRICA

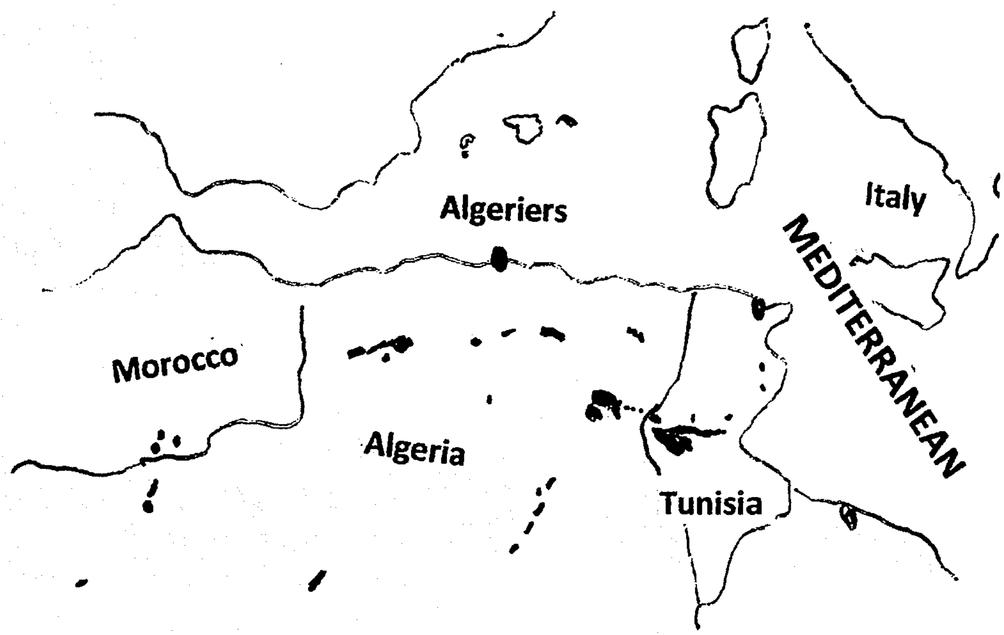
Prepared by Martin Nix B.U.S, A.A.S Seattle, WA, June, 2015

ABSTRACT: HelioHydroElectric is a little known solar engineering technology, using salt/sea water and solar power to create evaporation ponds for artificial rain in deserts. Africa has large HelioHydroElectric resources. Located in the African Continent are dry endorheic salt lakes. These can be flooded with salt/sea water to create clouds from evaporation. The additional rainfall would increase vegetation, thus removing carbon dioxide from the atmosphere. HelioHydroElectric technology is the only technology that can actually remove carbon dioxide from the atmosphere. The additional rainfall in Africa it will increase agriculture and provide new living space. Not only can salt/sea water be used, but also underground alkali aquifer water can be used to flood these dry salt lakes. It is proposed that wind and solar power be used, along with energy conservation, for water pumping. Development of HelioHydroElectric has the potential of solving the drought problem in Africa. Various sites were graphed for potential. Development of a new water source for Africa will help in economic development of the continent. It is hoped this paper will spur conversations and funding for a full feasibility study.



INTRODUCTION: Proposed is the pumping of salt/seawater inland to the Continent for flooding of existing dry salt lakes to create clouds, and thus artificial rain. This technology, known as HelioHydroElectric technology, will create more vegetation in the desert, region and in mountains, thus reversing Global Warming. It will stimulate the economy of Africa. Solar pumping technology is now very well developed. This Prefeasibility study is mostly to study the potential for construction of such a project. It is hoped that funding for a complete Feasibility study can be located so as to determine the environmental impact, climate impact, and economic impact along with construction plans and cost. Israel, Jordan and Palestine are presently constructing the Red to Dead Sea project, so as to add additional moisture to the region. Egypt has under study the Qattara Depression project. This is being reviewed elsewhere. Iran and Pakistan are considering HelioHydroElectric projects. Various sites were graphed for potential future study. In many cases data for the various sites was hard to obtain, however, these sites were estimated. It does give a general magnitude of order of the potential.

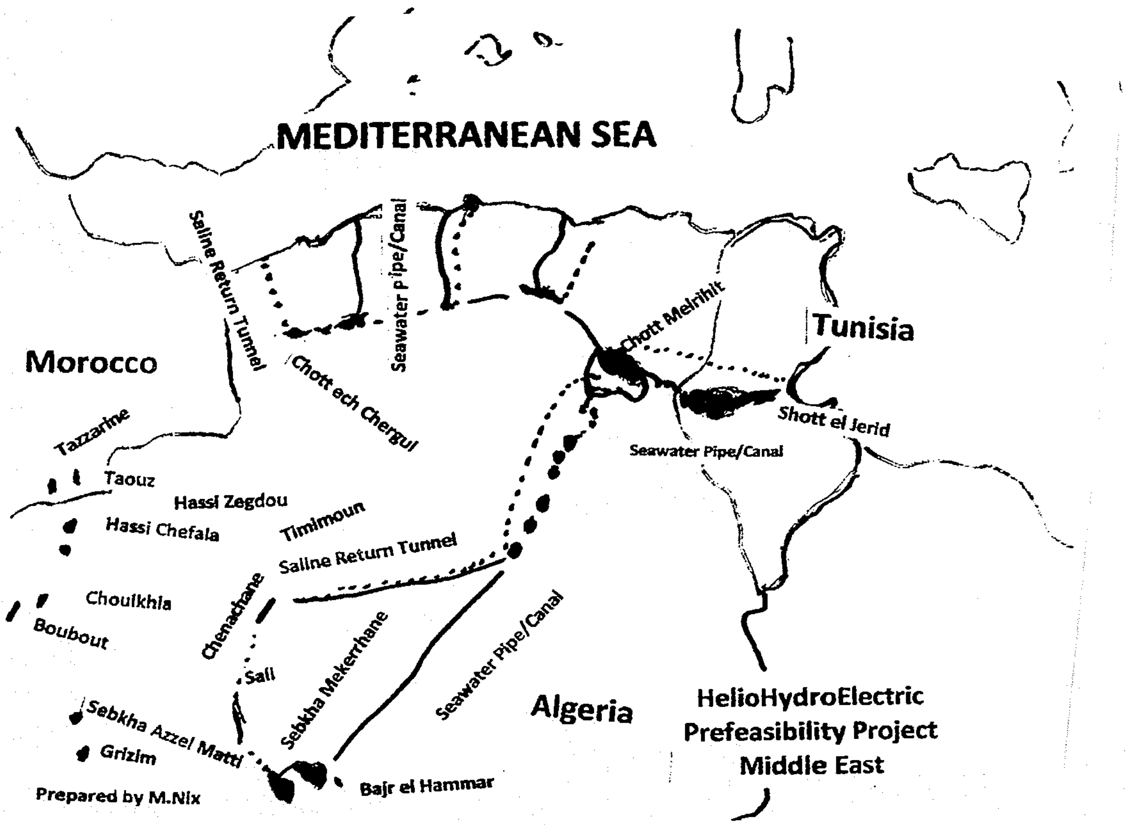


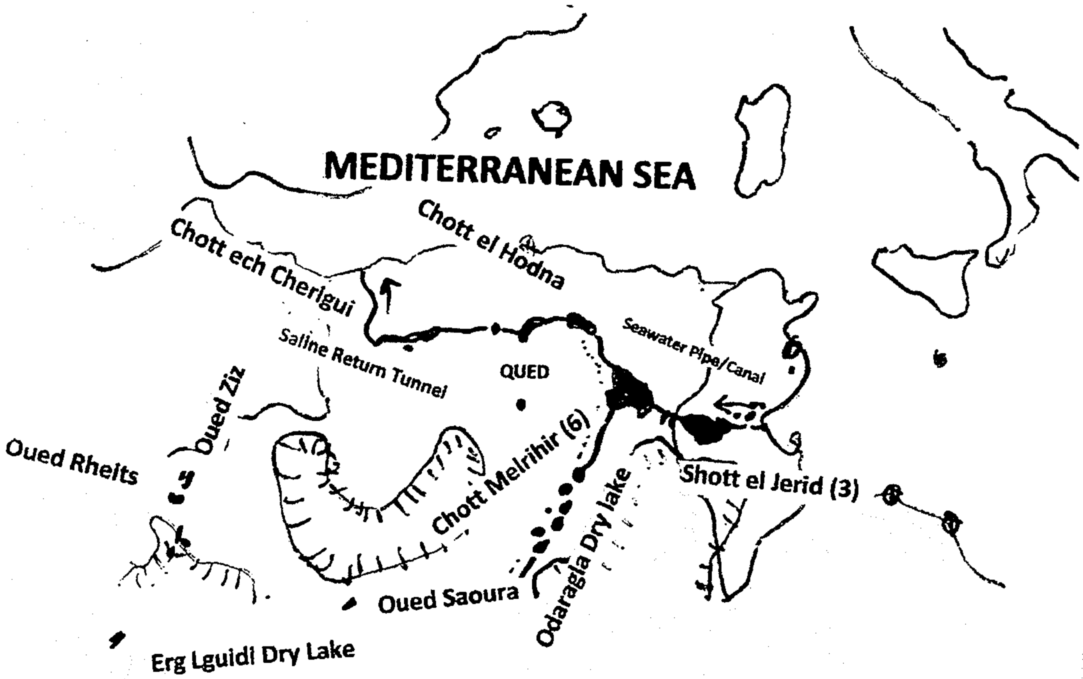


North Africa

HelioHydroElectric
Prefeasibility Project

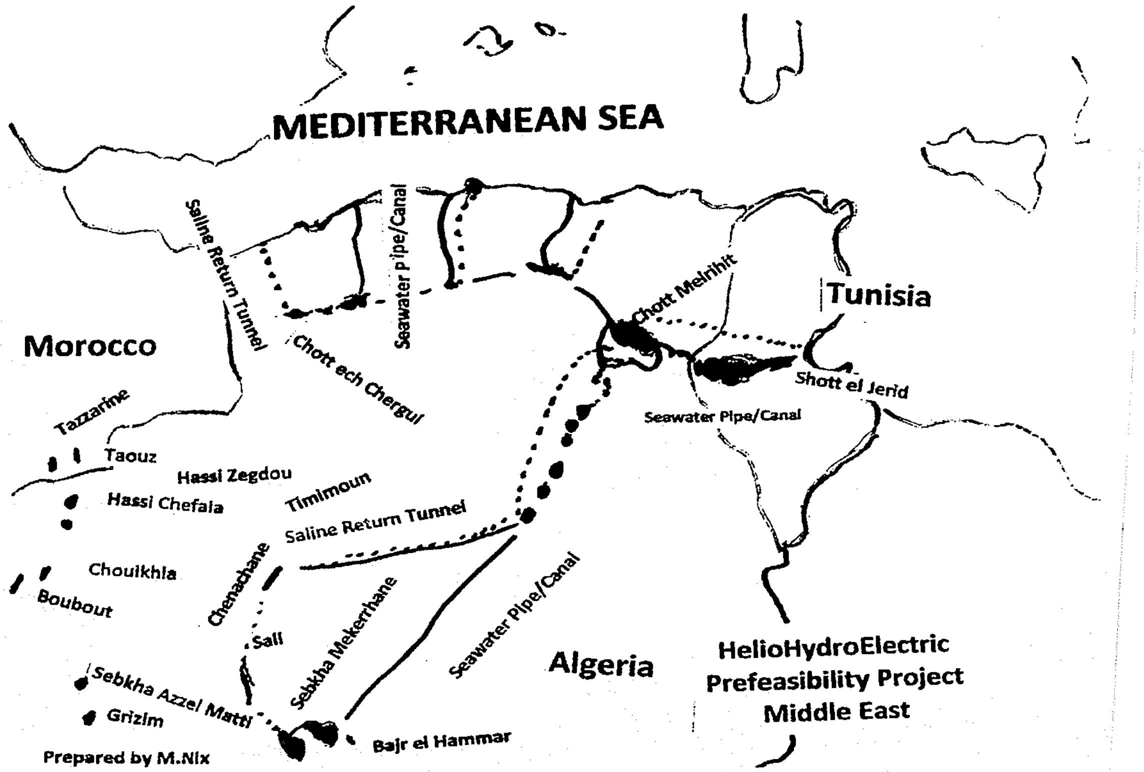
Prepared by M.Nix


MEDITERRANEAN SEA
Saline Return Tunnel
Seawater Pipe/Canal
Chott Melrhir
Tunisia
Morocco
Chott ech Chergui
Shott el Jerid
Seawater Pipe/Canal
Tazzarine
Taouz
Hassi Zegdou
Hassi Chefala
Timimoun
Saline Return Tunnel
Choulkhia
Boubout
Chenachane
Sali
Sebkha Mekerrhane
Seawater Pipe/Canal
Algeria
HelioHydroElectric
Prefeasibility Project
Middle East
Sebkha Azzel Matti
Grizim
Bajr el Hammar
Prepared by M.Nix



HelioHydroElectric
Prefeasibility Project

Prepared by M.Nix


MEDITERRANEAN SEA
Saline Return Tunnel
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Chott Melrihit
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Morocco
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Seawater Pipe/Canal
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Sali
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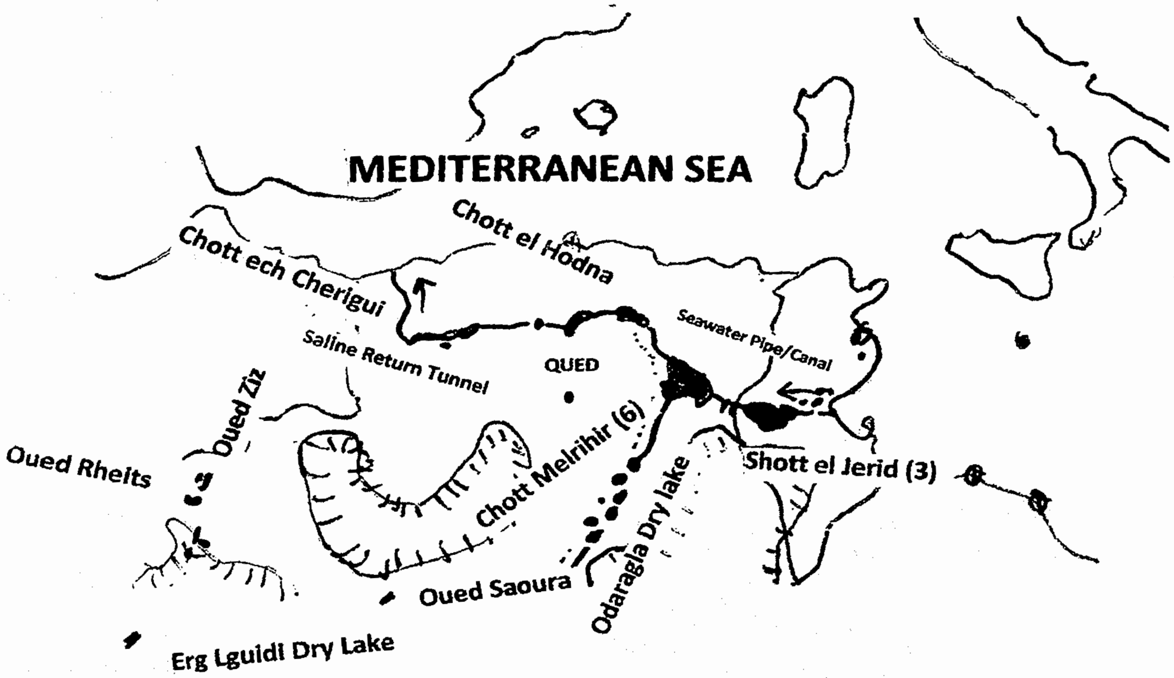
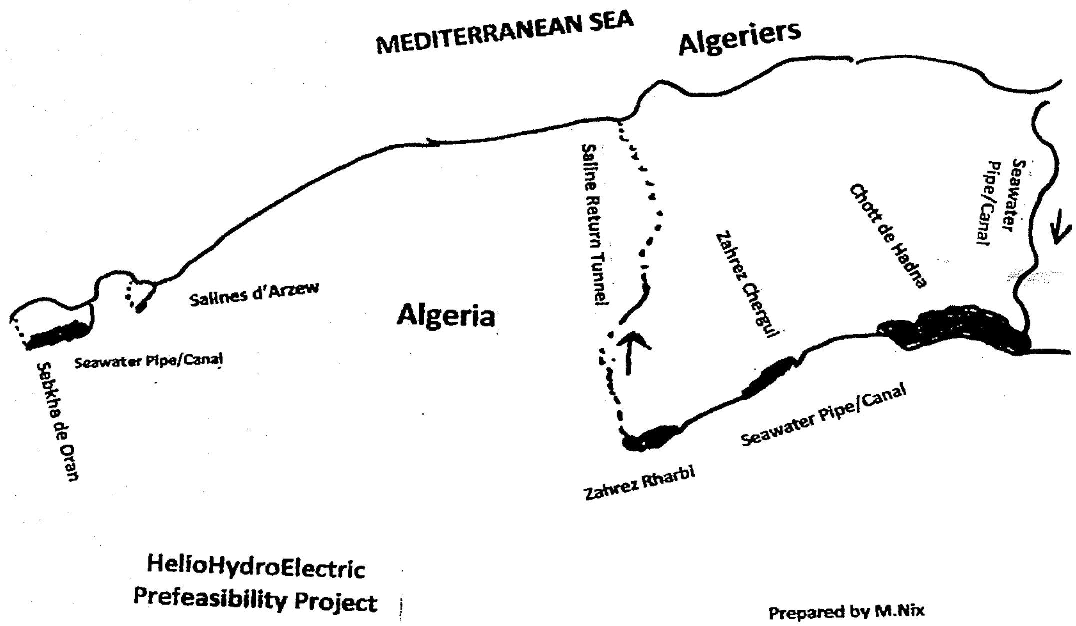


HelloHydroElectric
Prefeasibility Project

Prepared by M.Nix

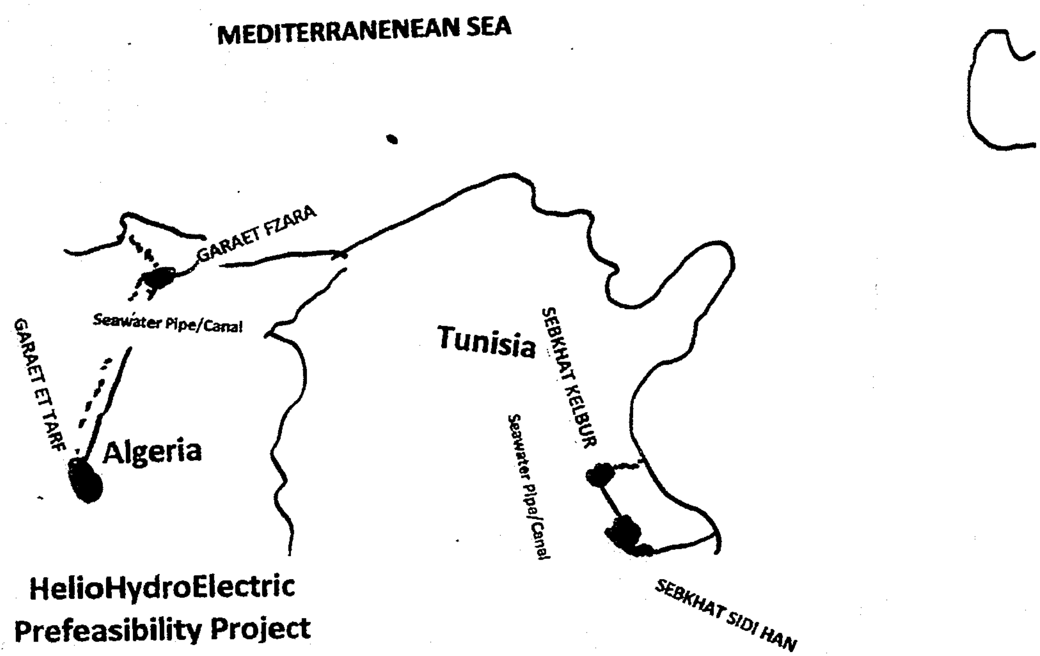


ALGERIA

Location	Square Mile Area	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Chott Ech Chergui	772	215,221,248	2,490	710
Chott Hodna	293	80,847,360	945	103
Ouargla Dry Lakes	400	111,513,600	1,290	78
ErglGuidi Dry Lakes	100	27,878,400	322	54
Qued	100	27,878,400	322	54
Oued Rherts	100	27,878,400	322	54
Oued Soura	100	27,878,400	322	54
Salinas D'Arzew	100	27,878,400	322	54
Sebkhade Onan	100	27,878,400	322	54
Zahrez Rharbi	300	83,635,200	968	968
Zahrez Chergui	100	27,878,400	322	54
Misc.Sites	1,000	278,784,000	3,226	273
Total:	**2,765**	**965,150,208 cu/ft/day**	**11,173 cu/ft/s**	**2,564 Megawatts**

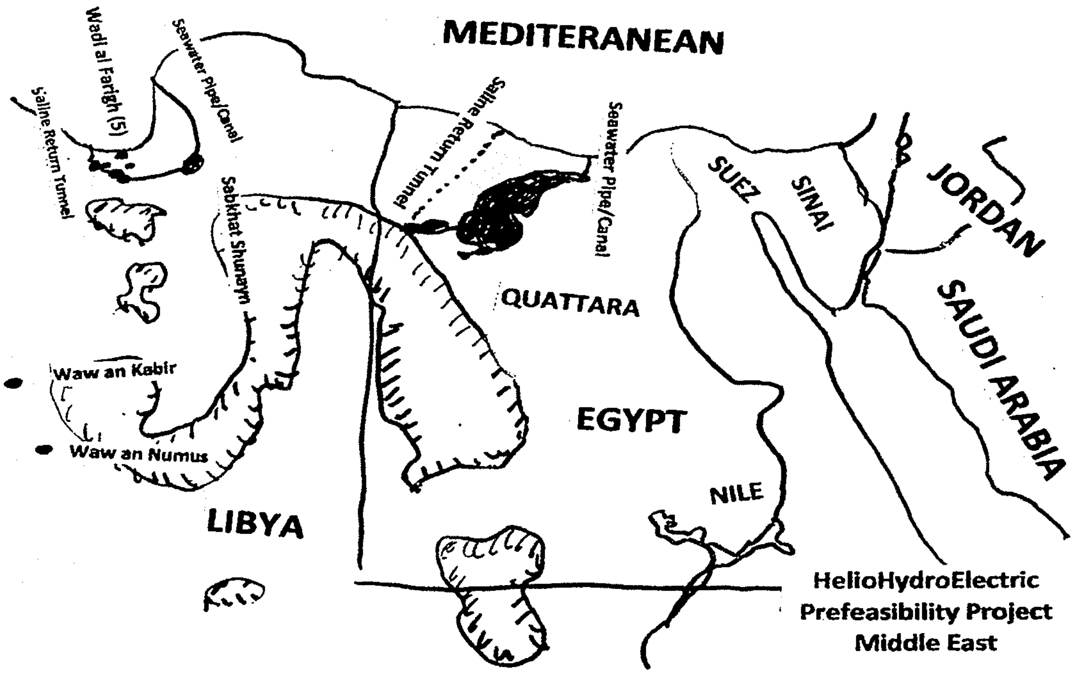
Algeria (Below Sea Level)

Location	Square Mile Area	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Chott Melvhir	2,600	724,838,400	8,389	-92
Sebkha Azzel Matti	100	27,878,400	322	-2
Tidikelt	100	27,878,400	322	-2
	2,800	780,595,200 cu/ft/day	9,033 cu/ft/s	-96 Megawatts



TUNISIA

Location	Square Mile Area	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Chott Dierd	2,296	640,088,064	7,408	18(MW)
Chott Gharsa	1,000	278,784,000	3,226	8
	3,296	918,872,064	10,634	26 Megawatts



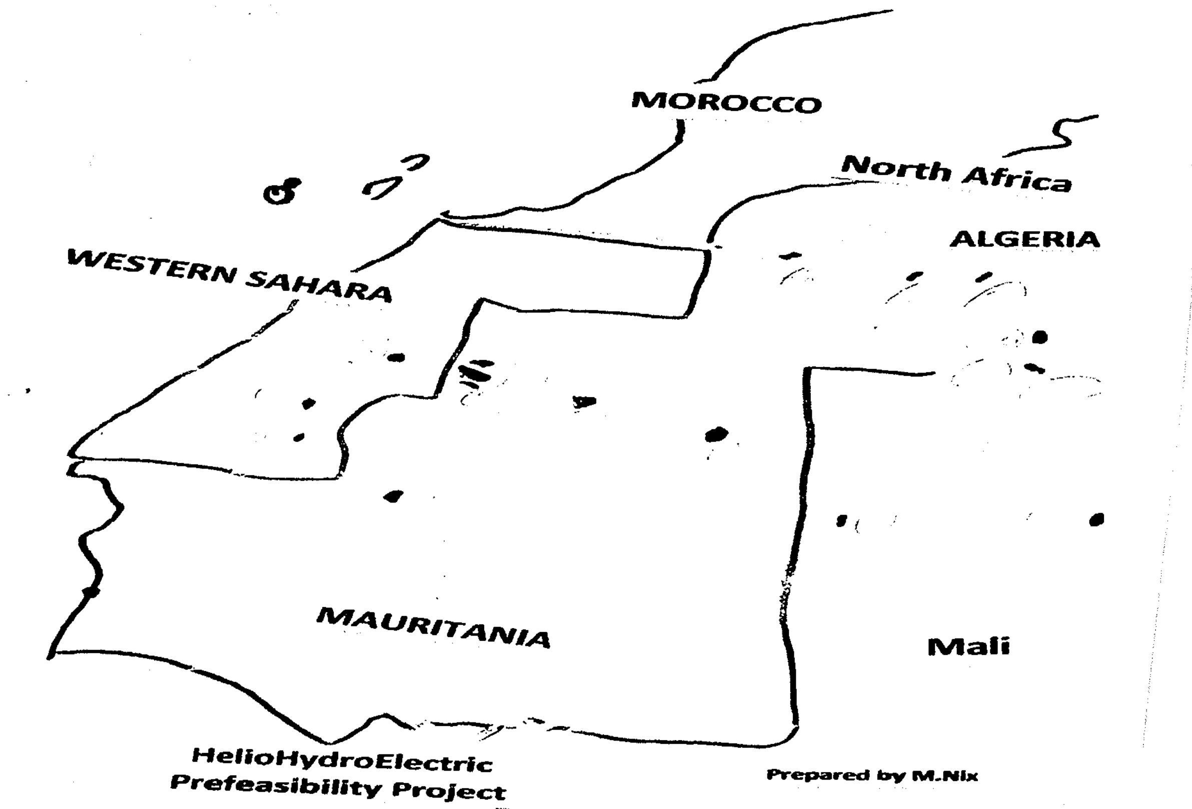
Prepared by M.Nix

LIBYA

Location	Square Miles	Evaporation/Day	Evaporation/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)

LIBYA (Below Sea Level)

Location	Square Miles	Evaporation/Day	Evaporation/Second	Power (Megawatts)
Sebkhet Te-N-Dghaneda	100	27,878,400	322	-27(MW)
Sabkhet Ghuzhauyyil	100	27,878,400	322	-41
	200	55,756,800	644	-68 Megawatts



MALI

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)

MAURITANIA

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)

WESTERN SAHARA

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)

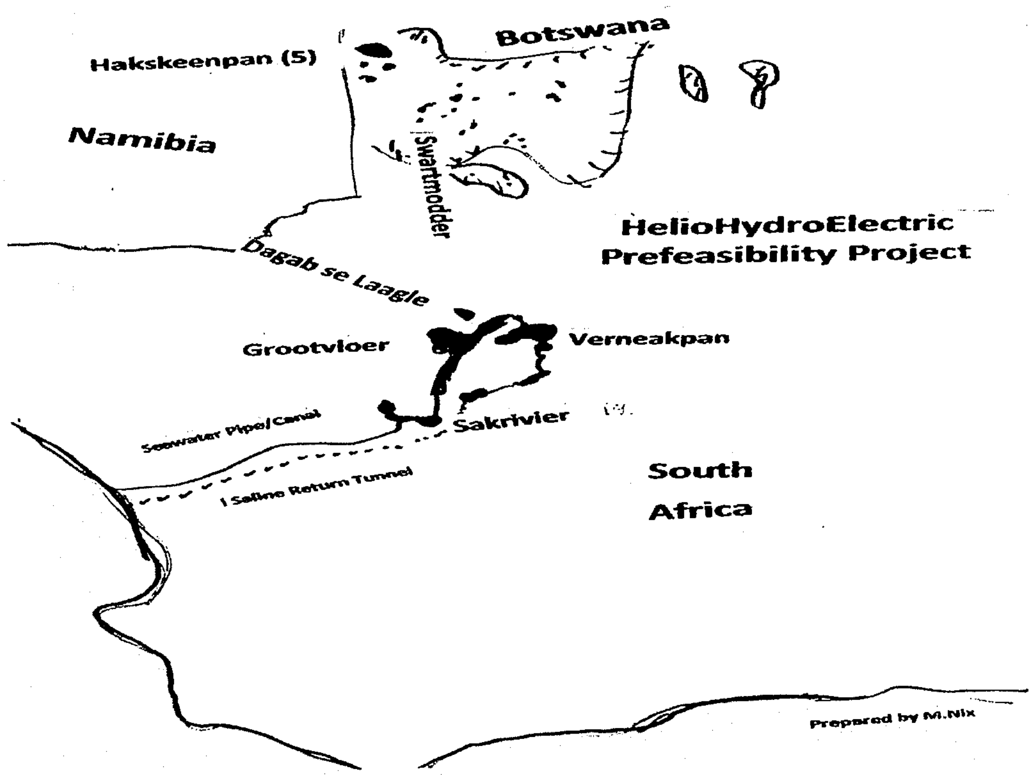
WESTERN SAHARA (Below Sea Level)

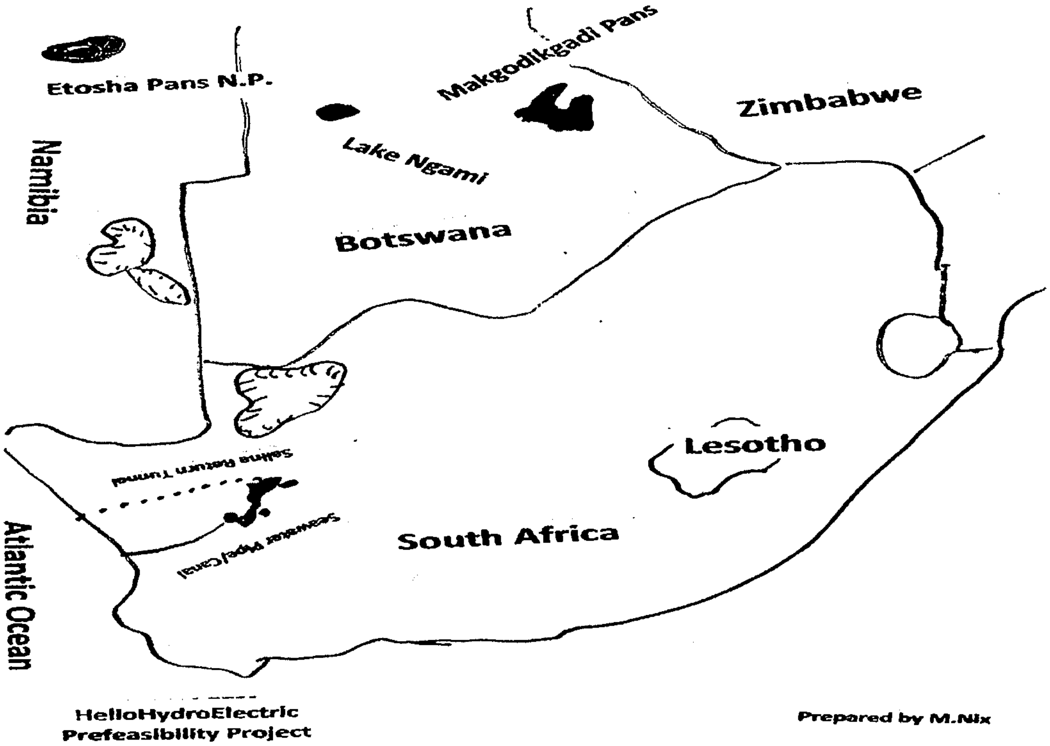
Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Sebkhat Tan	100	27,878,400	322	-5(MW)

MOROCCO

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)

Note: Data difficult to come by. Estimated.





BOTSWANA

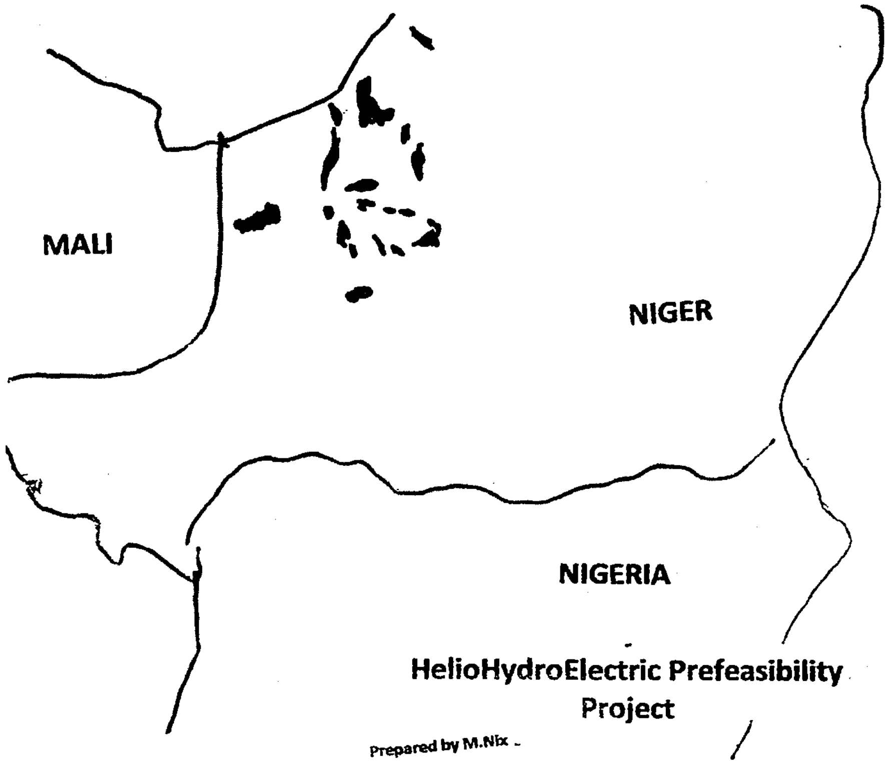
Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Makgadikgadi Pans	6,200	1,728,460,000	20,005	4,944

NAMBIA

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Etosha Pan	1,840	512,962,560	5,937	1,507

SOUTH AFRICA

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Hakskeen Pan	1,000	278,784,000	3,226	546
Verneak Pan	300	83,635,200	968	163
Sakrivier	100	27,878,400	322	54
Grootviver	1,000	278,784,000	3,226	546
Dagab se Lagle	100	27,878,400	322	54
	2,500	696,960,200	8,064	1,363

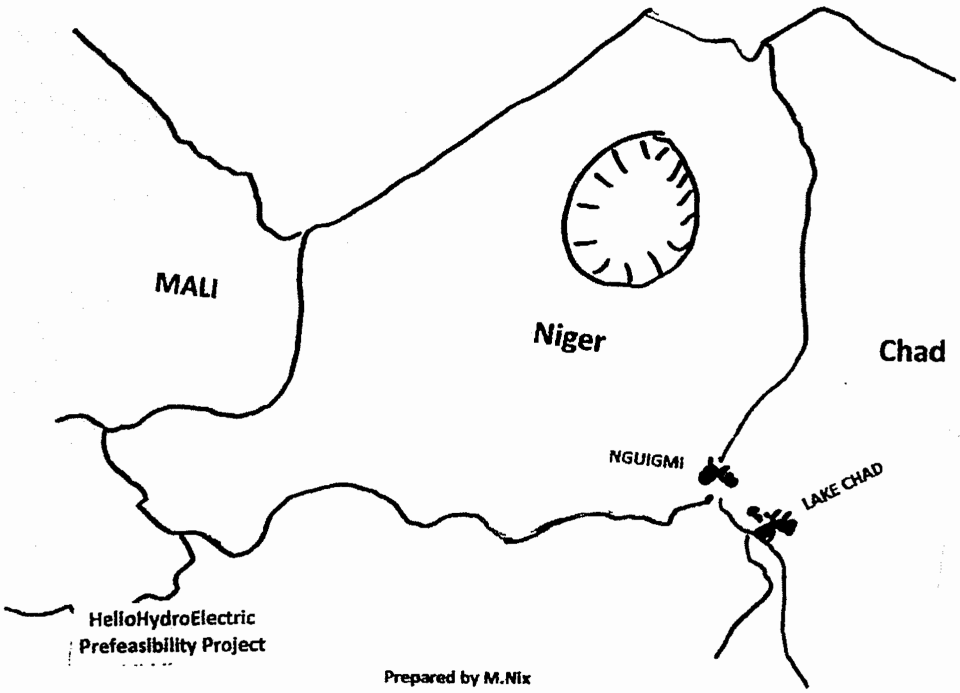


NIGER

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)

CAMEROON

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)



CHAD

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Lake Chad	1,000	278,784,000	3,226	246 (MW)

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ANCIENT LAKE CHAD***

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Ancient Chad	940,000	262,056,960,000	3,033,060	256,719 (MW)

***** In ancient times, there was a giant lake in the middle of Africa. Done for reference of the maximum potential.**

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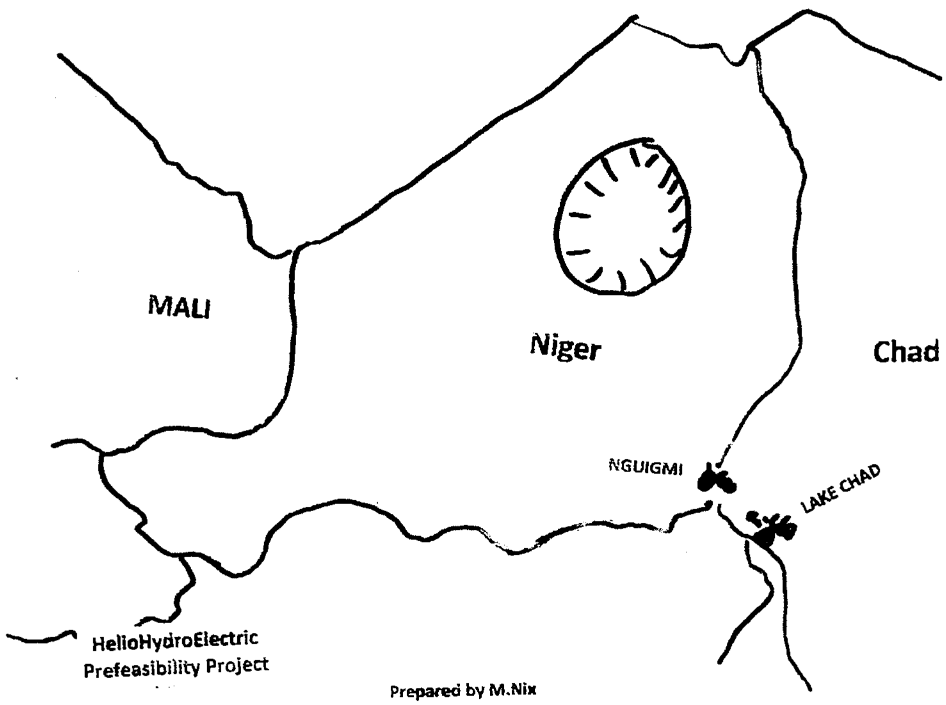
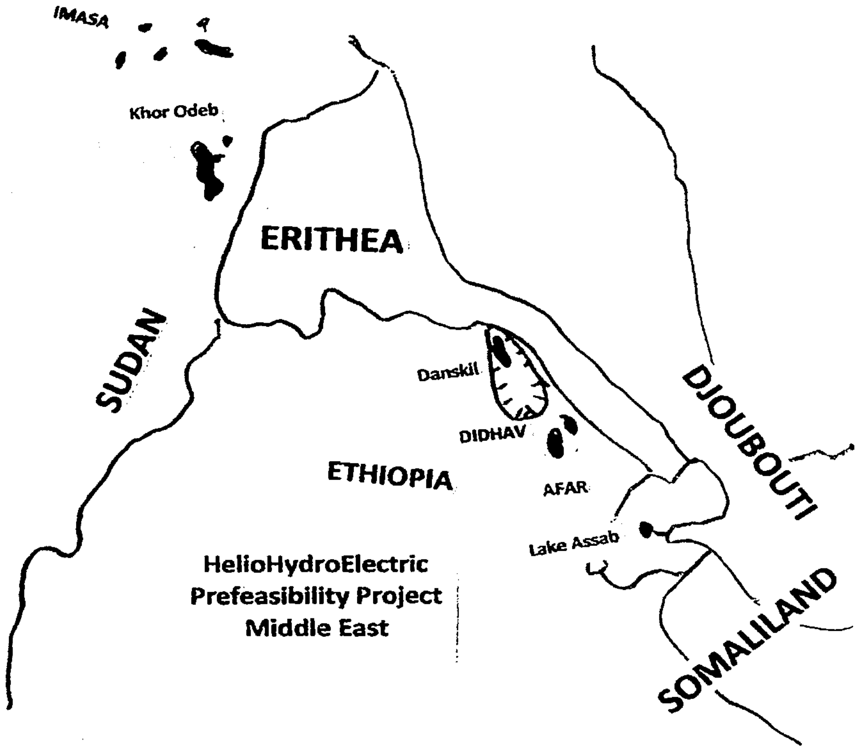


NIGER

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)



ETHIOPIA (Below Sea Level)

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
AFAR Region	460	128,240,640	1,484	-51

ETHIOPA

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)
Chamo	213	59,380,492	687	235
Zway	187	21,326,080	246	273
Shala	127	35,405,680	409	176
Langano	97	27,042,048	312	137
Abijatia	79	22,023,936	254	110
Awasa	50	13,939,200	161	68
	1,753	457,901,436	5,295	1,545

ERITHEA

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)

SPAIN

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546 (MW)

KENYA

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Turkana	2,473	689,432,830	7,979	243(MW)
Baringo	80	22,302,720	258	69
Bogoria	60	16,727,040	193	53
Nakura	17	4,739,328	54	26
Elmenteita	10	2,787,840	32	14
Naivasha	61	17,005,824	196	102
Magdi	38	10,543,792	122	51
Natron	350	97,574,400	1,129	191
	3,089	861,113,774	9,963	749

DJIBOUTI (Below Sea Level)

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Lake Assal	2,050	571,507,200	6,614	-210(MW)

SUDAN

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Khorodeb	200	55,756,800	645	109 (MW)
Misc.Sites	1,000	278,784,000	3,226	546
	1,200	334,540,800	3,871	655

SOUTH SUDAN

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Misc.Sites	1,000	278,784,000	3,226	546

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SUMMARY

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AFRICA (Below Sea Level)

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Africa	5,600	1,563,978,240	18,097	-432

AFRICA (Above Sea Level)

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Africa	32,803	9,849,247,442	113,976	32,803
19,714				

AFRICA (Above and Below Sea Level)

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
TOTAL:	38,403	11,413,225,680*	132,073*	32,803-432=32,371**

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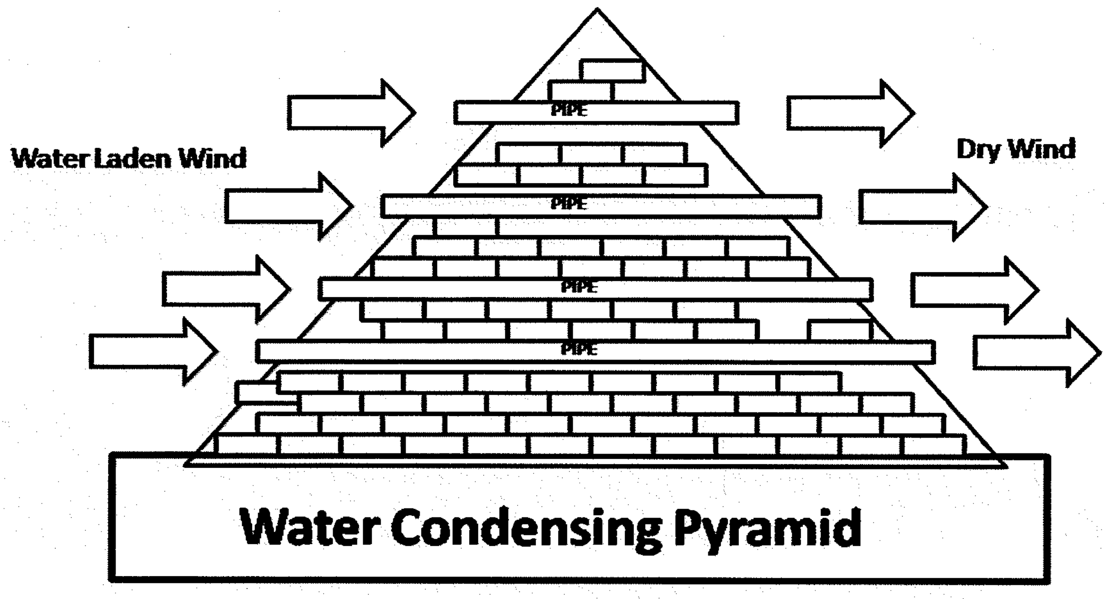
*Assumes 100% efficiency.

** Assumes 1% evaporation rate per day per surface area.



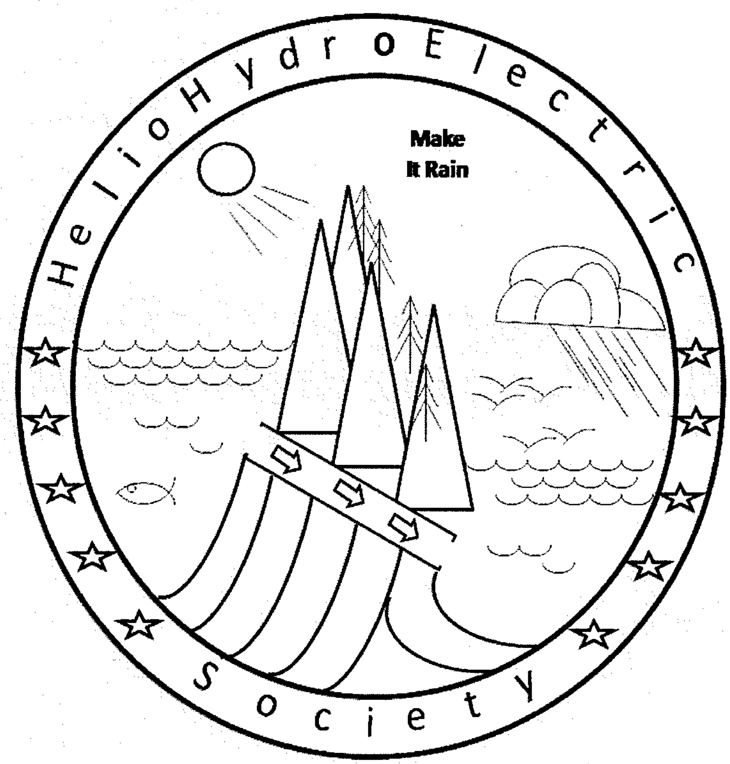
SOMALIA: Used in Ancient Somalia, brick pyramids were built to condense water from the atmosphere, thus creating fresh water for gardens and vegetation. These pyramids can again be built throughout desert coastal regions, to condense fresh water from the atmosphere. The cool bricks remove water from the hot air, much like condensation on a cold glass of ice water. This is a lost ancient technology.

Prepared by M. Nix

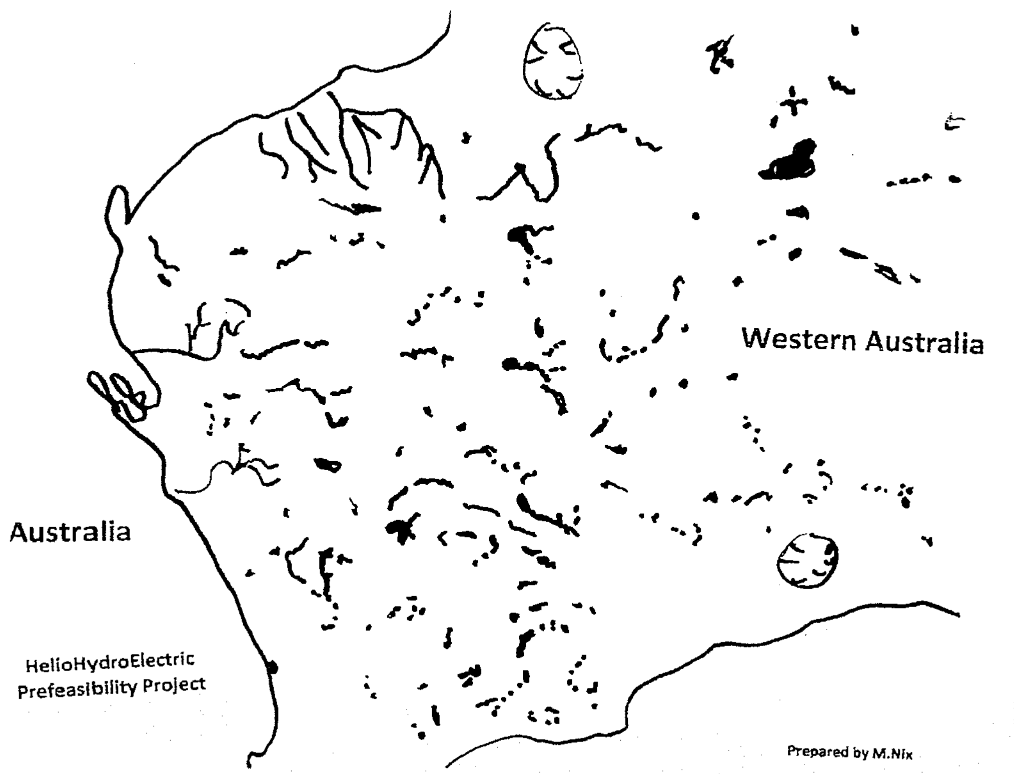
HelioHydroElectric Potential
Prefeasibility Study
Australia

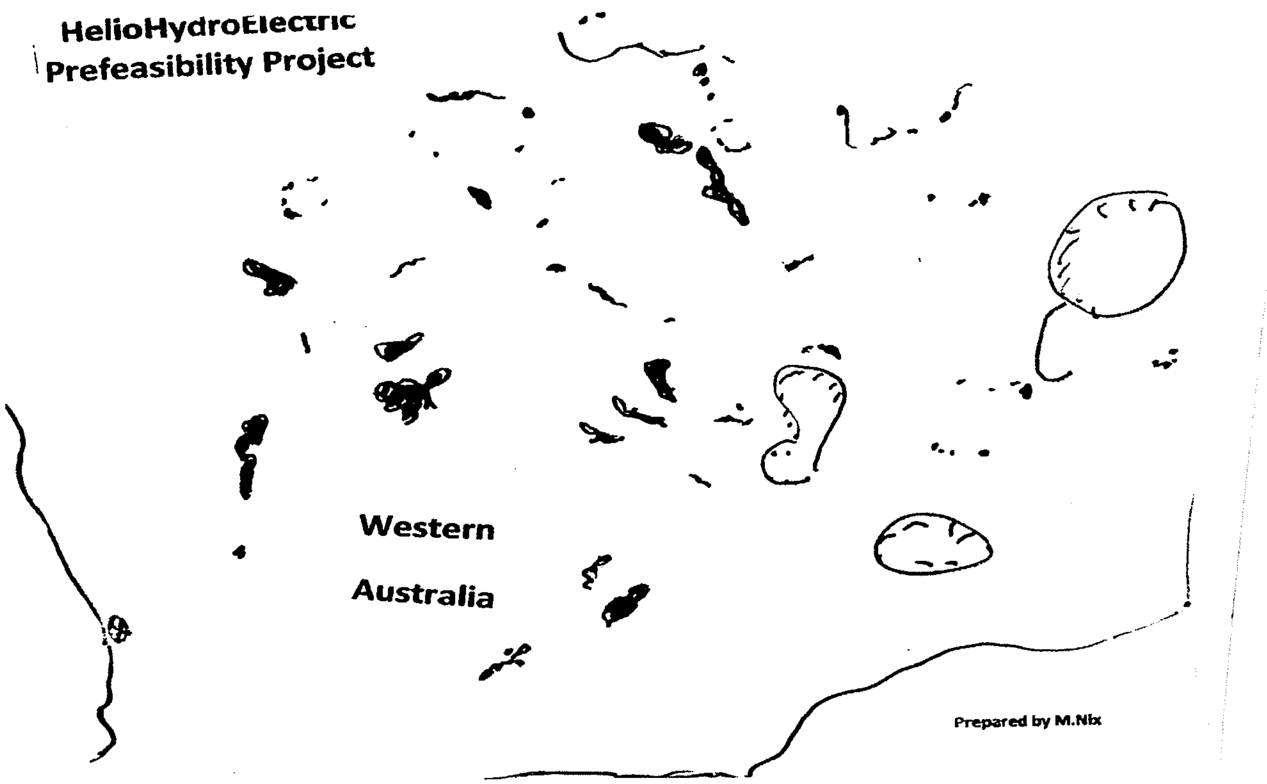
Prepared by Martin Nix B.U.S, A.A.S Seattle, WA, June, 2015

ABSTRACT: HelioHydroElectric is a little known solar engineering technology, using salt/sea water and solar power to create evaporation ponds for artificial rain in deserts. Australia has large HelioHydroElectric resources. Located in the Australian Continent are dry endorheic salt lakes. These can be flooded with salt/sea water to create clouds from evaporation. The additional rainfall would increase vegetation, thus removing carbon dioxide from the atmosphere. HelioHydroElectric technology is the only technology that can actually remove carbon dioxide from the atmosphere. The additional rainfall in Australia will increase agriculture and provide new living space. Not only can salt/sea water be used, but also underground alkali aquifer water can be used to flood these dry salt lakes. It is proposed that wind and solar power be used, along with energy conservation, for water pumping. Development of HelioHydroElectric has the potential of solving the drought problem in Australia. Various sites were graphed for potential for potential study. It is proposed that solar pond technology also be developed for Australia. It is hoped this paper will spur conversations and funding for a full feasibility study.

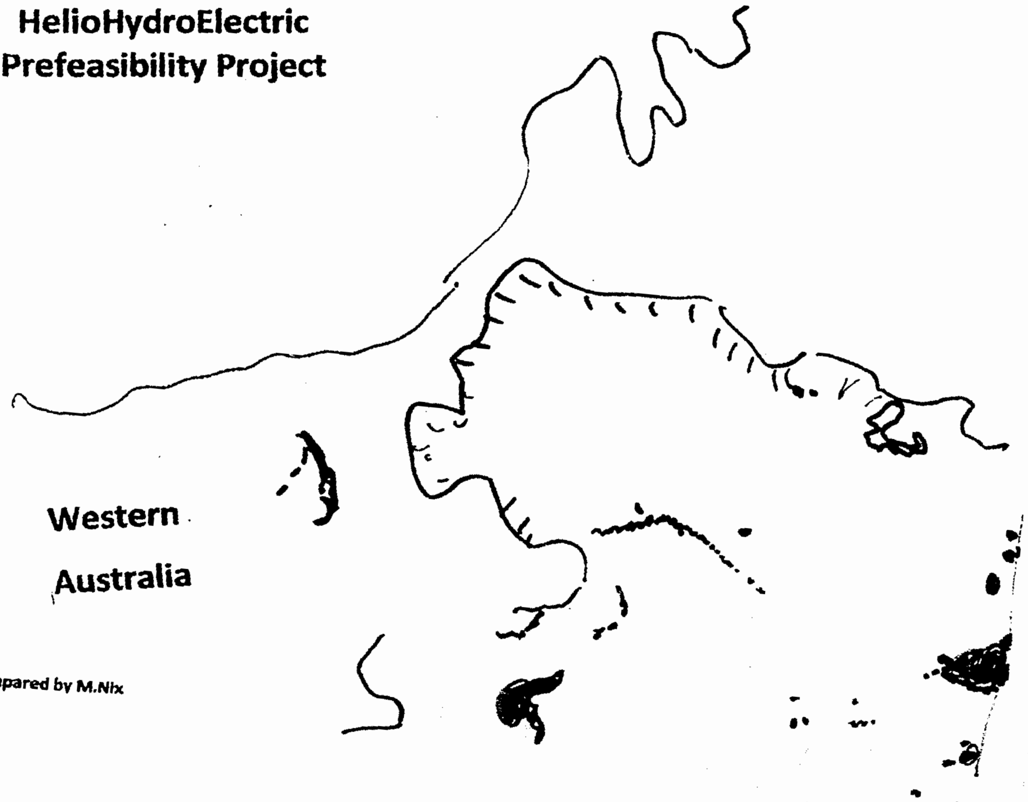


NTRODUCTION: Proposed is the pumping of salt/seawater inland into Australia for flooding of existing dry salt lakes to create clouds, and thus artificial rain. This technology, known as HelioHydroElectric technology, will create more vegetation in the desert, region and in mountains, thus reversing Global Warming. It will stimulate the economy of Australia. Solar pumping technology is now very well developed. This Prefeasibility study is mostly to study the potential for construction of such a project. It is hoped that funding for a complete Feasibility study can be located so as to determine the environmental impact, climate impact, and economic impact along with construction plans and cost. Israel, Jordan and Palestine are presently constructing the Red to Dead Sea project, so as to add additional moisture to the region. Egypt has under study the Qattara Depression project. This is being reviewed elsewhere. Iran and Pakistan are considering HelioHydroElectric projects.



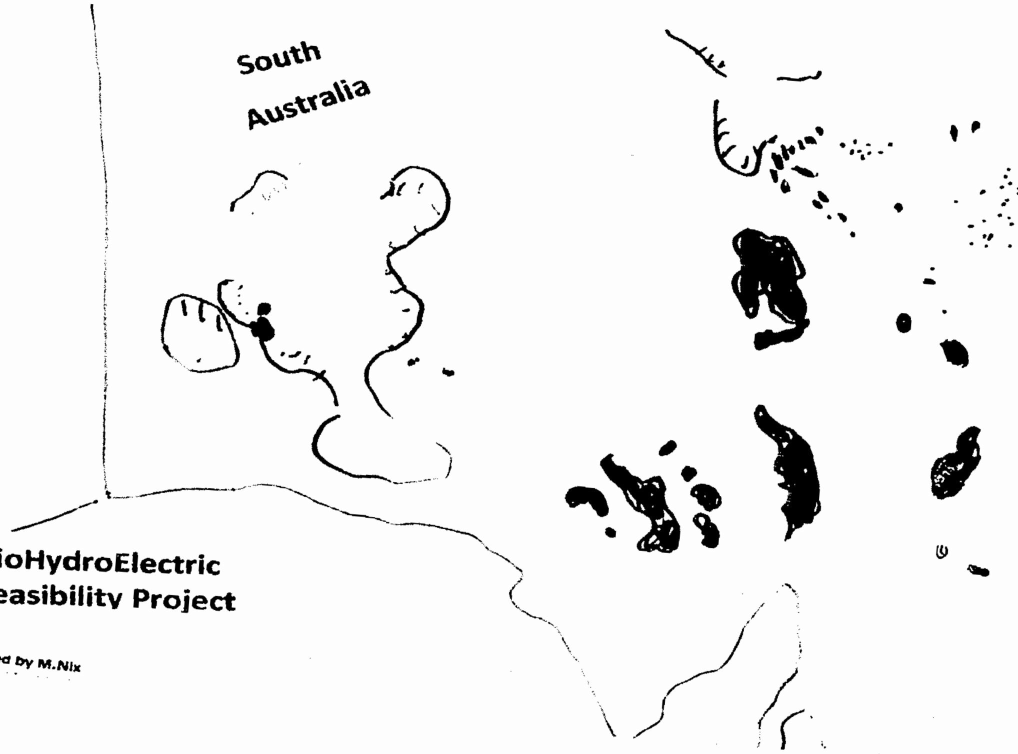

HelioHydroElectric
Prefeasibility Project
Western
Australia
Prepared by M.Nix

HelioHydroElectric Prefeasibility Project



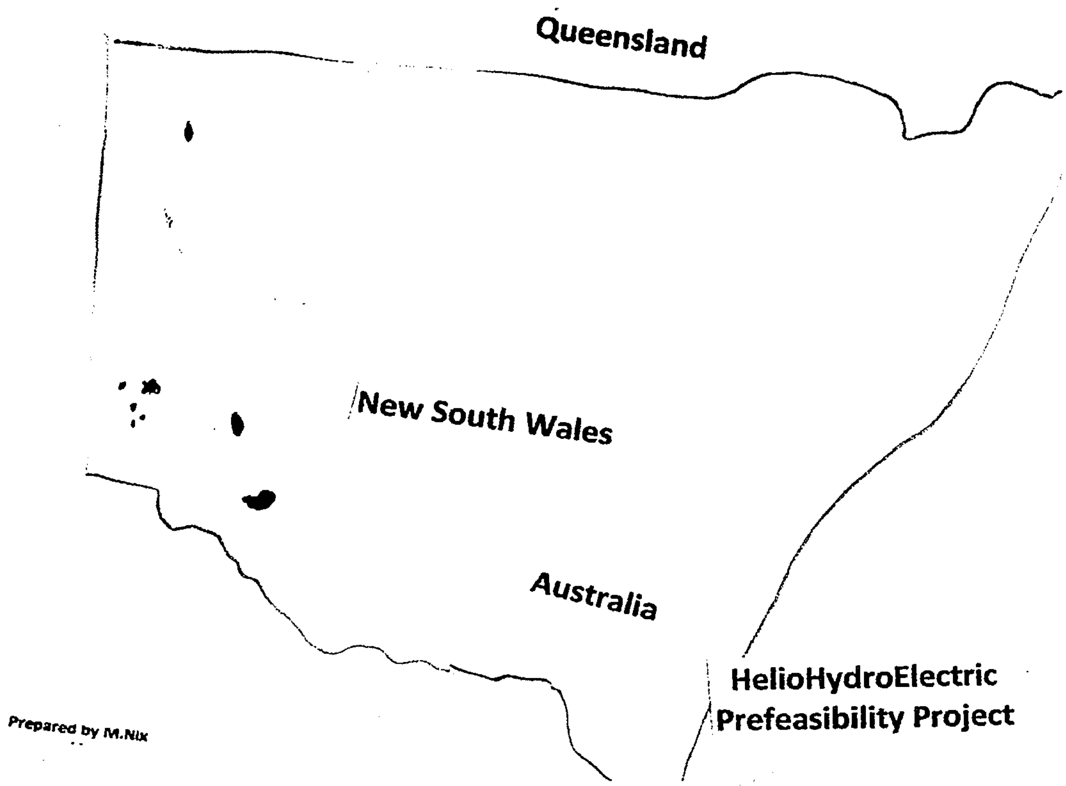
Prepared by M.Nix


HelioHydroElectric
Prefeasibility Project
Northern Territory
Queensland
South Australia
New South Wales
Prepared by M.Nix



HelioHydroElectric Prefeasibility Project

Prepared by M.Nix


Queensland
New South Wales
Australia
HelioHydroElectric
Prefeasibility Project
Prepared by M.Nix

AUSTRALIA

Location	Square Mile Area	Evaporation Rate (cu/ft/day)	Evaporation Rate(cu/ft/second)	Power
Amadeus	398	110,956,032	1,284	194MW
Ballard	19	5,296,896	61	1
Cadibarrawirracanna	1,000	278,784,000	3,226	546
Carey	617	17,200,978	1,990	129
Disappointment	146	40,702,464	471	50
Dumbleyung	20	5,597,278	15	1
Dundas	100	27,878,400	322	21
Frome	1,002	279,341,560	3,233	538
Gairdner	1,679	468,078,330	5,417	182
Galilee	99	277,585,522	321	24
Gregory	1	278,784	3	1
Goyder	1,036	288,820,224	3,342	11
Hart	1	17,005,824	78	21
Island	100	27,878,400	322	27
LeFroy	500	139,392,000	1,613	136
MacLeod	579	161,415,936	1,868	2
Mungo	300	83,635,200	968	66
Omeo	100	27,878,400	322	61
Perkolilli	1	278,784	3	1
Torrens	2,200	613,324,800	7,098	58
Woods	503	140,228,352	1,623	128
Yamma	270	75,271,680	871	23
Barlee	3,088	860,884,992	9,963	1,114
MacKay	1,829	508,985,936	5,901	619
Urana	1	278,784	3	1
Misc.Sites	1,000	278,784,000	3,226	273
Total:	16,589	4,735,763,356**	53,544**	4,140 Megawatts*

AUSTRALIA (Below Sea Level)

Location	Square Mile Area	Evaporation Rate (cu/ft/day)	Evaporation Rate(cu/ft/second)	Power
Eyre	3,668	1,022,579,712**	11,835**	-30MW*

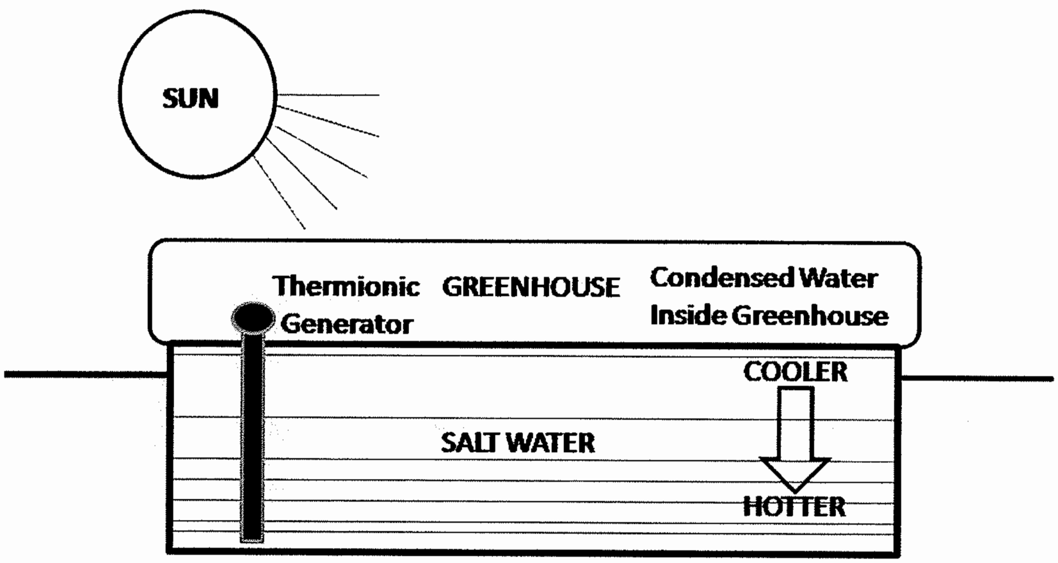
SUMMARY

Location	Square Mile Area	Evaporation Rate (cu/ft/day)	Evaporation Rate(cu/ft/second)	Power
Australia	20,257	5,758,343,068**	65,379**	4,140-30= 4,110MW

ANCIENT AUSTRALIA

Location	Square Mile Area	Evaporation Rate (cu/ft/day)	Evaporation Rate(cu/ft/second)	Power
Lake Eyre Basin	463,323	129,167,039,200	1,494,988	126,538 MW

Note: Australia use to have a very large ancient lake in the interior.



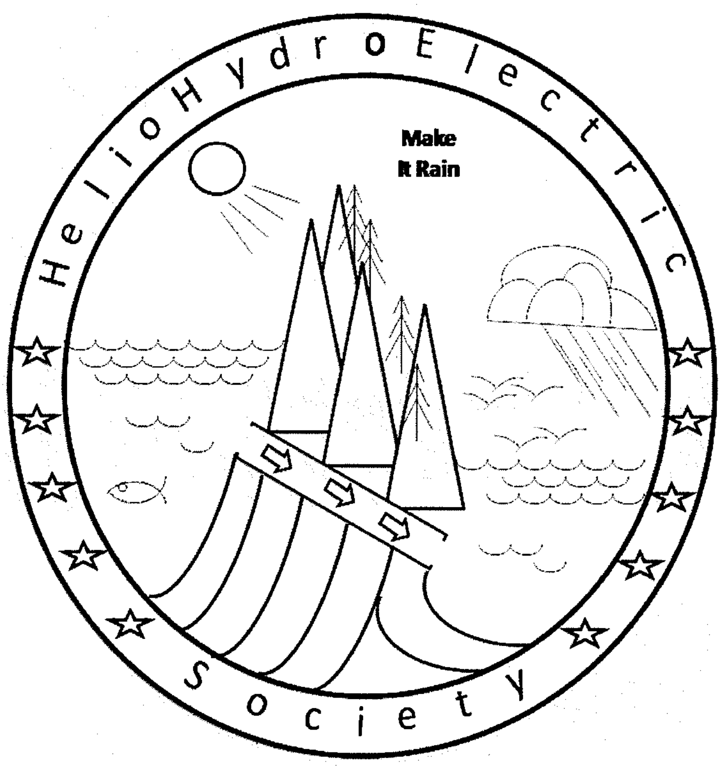
SOLAR PONDS: These can make fresh water from condensation in the greenhouse, however, the salt water inside the greenhouses uses the saline difference to create electricity via a heat transfer fluid, or heat engine. The salt water is hotter at bottom, than the salt water at top of the pond. The temperature difference can drive a low temperature working fluid to drive a small turbine.

Prepared by M. Nix

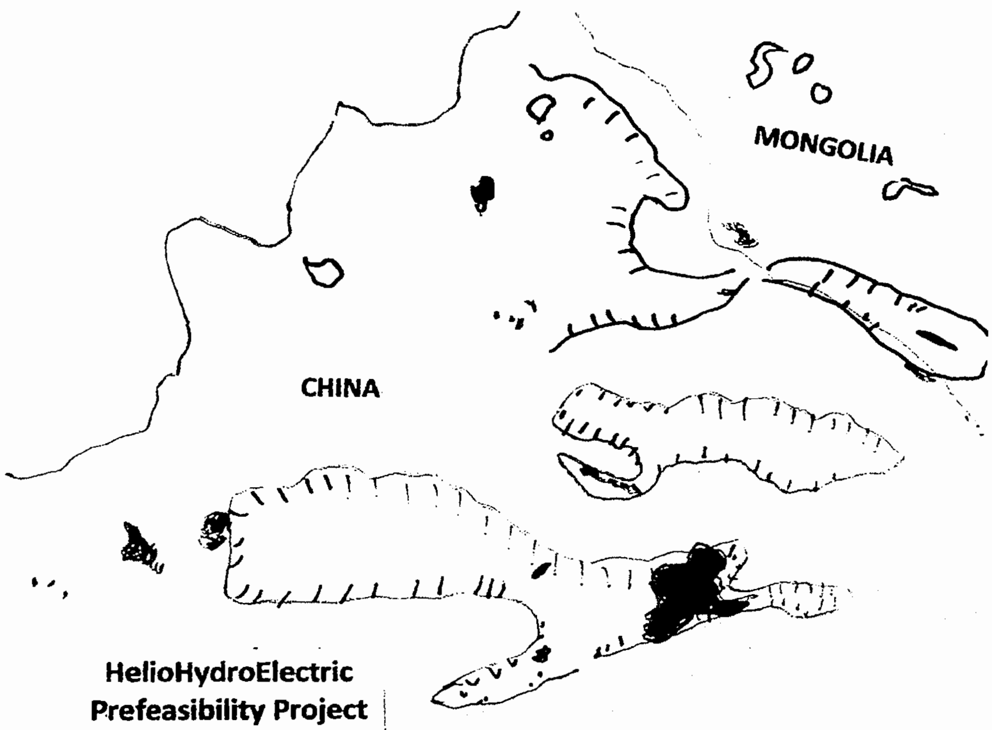
HelioHydroElectric Potential
Prefeasibility Study
CHINA, MONGOLIA

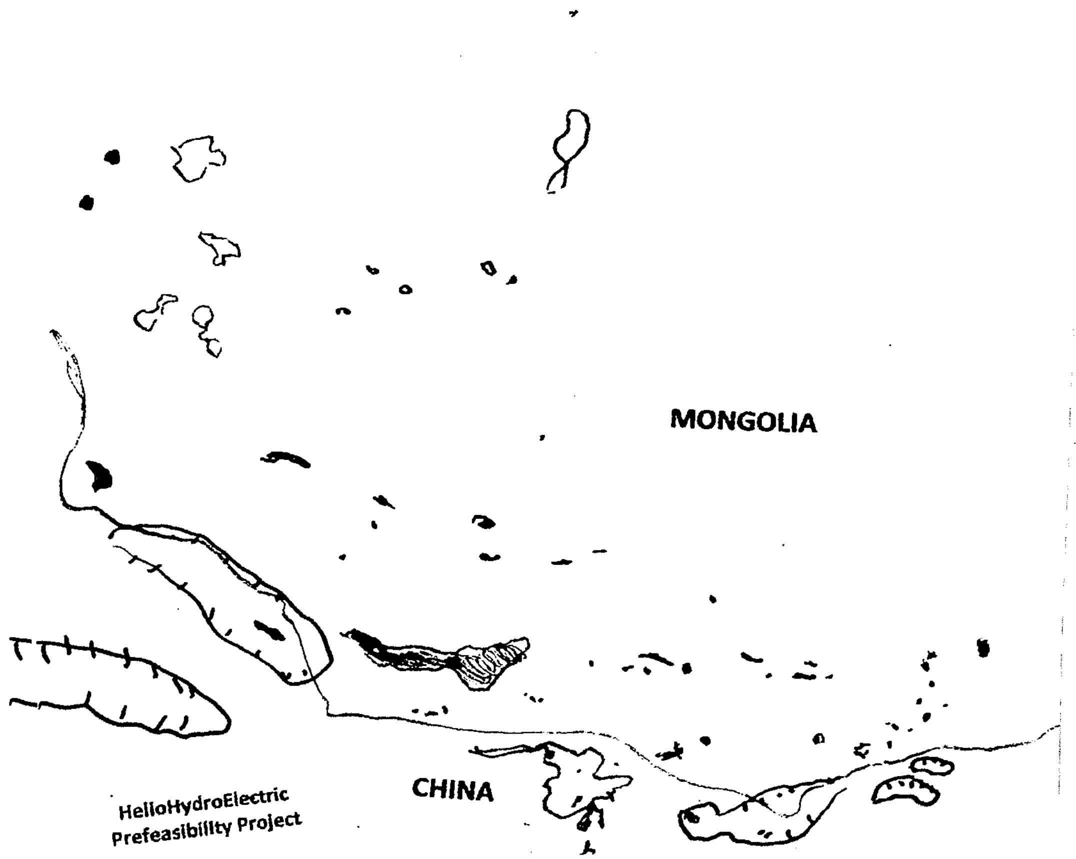
Prepared by Martin Nix B.U.S, A.A.S Seattle, WA, June, 2015

ABSTRACT: HelioHydroElectric is a little known solar engineering technology, using salt/sea water and solar power to create evaporation ponds for artificial rain in deserts. China and Mongolia have large HelioHydroElectric resources. Located in China and Mongolia are dry endorheic salt lakes. These can be flooded with salt/sea water to create clouds from evaporation. The additional rainfall would increase vegetation, thus removing carbon dioxide from the atmosphere. HelioHydroElectric technology is the only technology that can actually remove carbon dioxide from the atmosphere. The additional rainfall in China and Mongolia will increase agriculture and provide new living space. Not only can salt/sea water be used, but also underground alkali aquifer water can be used to flood these dry salt lakes. It is proposed that wind and solar power be used, along with energy conservation, for water pumping. Development of HelioHydroElectric has the potential of solving the drought problem. It is hoped this paper will spur conversations and funding for a full feasibility study.



INTRODUCTION: Proposed is the pumping of salt/seawater inland to China and Mongolia for flooding of existing dry salt lakes to create clouds, and thus artificial rain. This technology, known as HelioHydroElectric technology, will create more vegetation in the desert, region and in mountains, thus reversing Global Warming. It will stimulate the economy of the China and Mongolia. Solar pumping technology is now very well developed. This Prefeasibility study is mostly to study the potential for construction of such a project. It is hoped that funding for a complete Feasibility study can be located so as to determine the environmental impact, climate impact, and economic impact along with construction plans and cost. Israel, Jordan and Palestine are presently constructing the Red to Dead Sea project, so as to add additional moisture to the region. Egypt has under study the Qattara Depression project. This is being reviewed elsewhere. Iran and Pakistan are considering HelioHydroElectric projects.




MONGOLIA
CHINA
HelioHydroElectric
Prefeasibility Project

CHINA/MONGOLIA/KAZAKSTAN/RUSSIA

LOCATION	AREA (Sq.Miles)	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Balk Hash	6,300	1,756,339,200(cu/ft/day)	20,328 (cu/ft/s)	1,927 (MW)
Alakol	1,020	284,359,680	3,291	317
Ebi	400	111,513,600	1,290	67
Manas	91	25,369,344	293	21
Ailik	19	5,296,896	61	4
Lop Nur	3,900	1,087,257,600	12,584	3,195
Hulun	903	251,741,952	2,913	436
Nam	740	206,300,160	2,387	3,127
Siling	720	200,724,489	2,323	2,922
Tangra	400	1,115,136,000	12,906	1,529
Ngangze	400	1,115,136,000	12,906	1,528
Taro	400	1,115,136,000	12,906	1,091
Ngangla	400	1,115,136,000	12,906	1,222
Zhari Namco	400	1,115,136,000	12,906	1,652
Dagzi	400	1,115,136,000	12,906	1,528
Doga Coring	200	55,756,100	645	764
Qinghui	1,733	483,113,267	5591	662
Qaidam Basin	1,000	278,789,000	3,226	321
Kumkol Basin	1,000	278,784,000	3,226	3,822
Issykkul (Kry.)	2,408	671,311,872	7,769	3,466
Song Kol	140	39,029,760	451	377
Chaty-r-Kul (Kry.)	70	19,514,880	225	220
Uvsnuur Basin	5,000	1,393,920,000	16,133	13,655
Khuargas Nuur	571	159,185,664	1843	210
Khar-Us	577	160,858,368	1861	238
Khar Lake	222	61,890,048	716	89
GOBI Desert	10,000	2,787,840,000	32,266	13,627
Misc.Sites	1,000	278,784,000	3,336	2,731
Total:	38,614	17,288,495,880**	198,598**	60,748(MW) *

China (Below Sea Level)

Location	Sq.Miles	Evaporation/Day	Evaporation/Second	Power
Turpan Depression	19,000	5,296,896,000**	61,306	-259 MW*

SUMMARY

China (Below Sea Level and Above Sea Level)

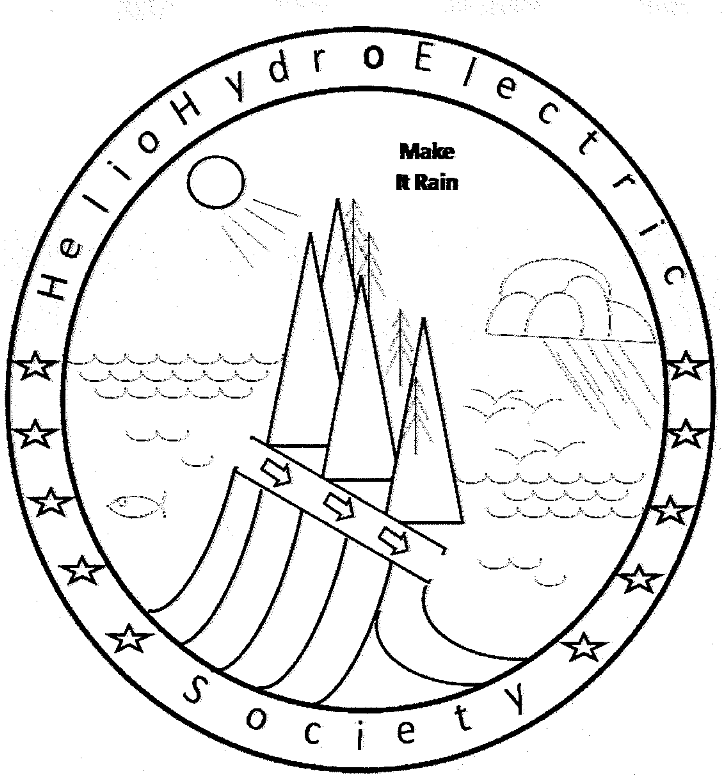
Location	Sq.Miles	Evaporation/Day	Evaporation/Second	Power
China/Region	57,614	22,585,391,880	259,904	60,748-259=60,489MW

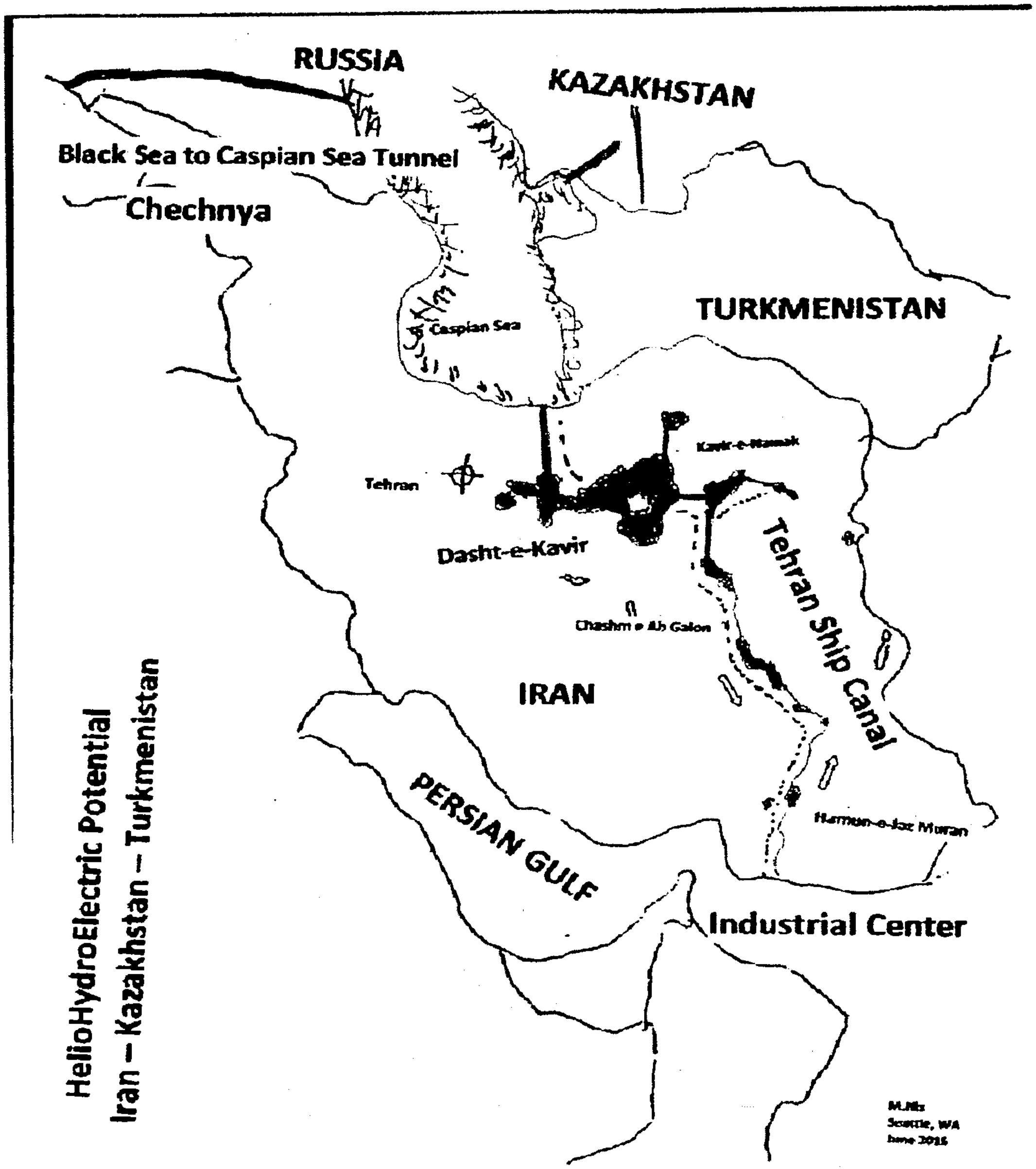
*** Assumes 100% conversion, does not include efficiency loses, such as friction, motor or generator loses, transmission, etc.**
**** Assumes 1% evaporation rate per day.**

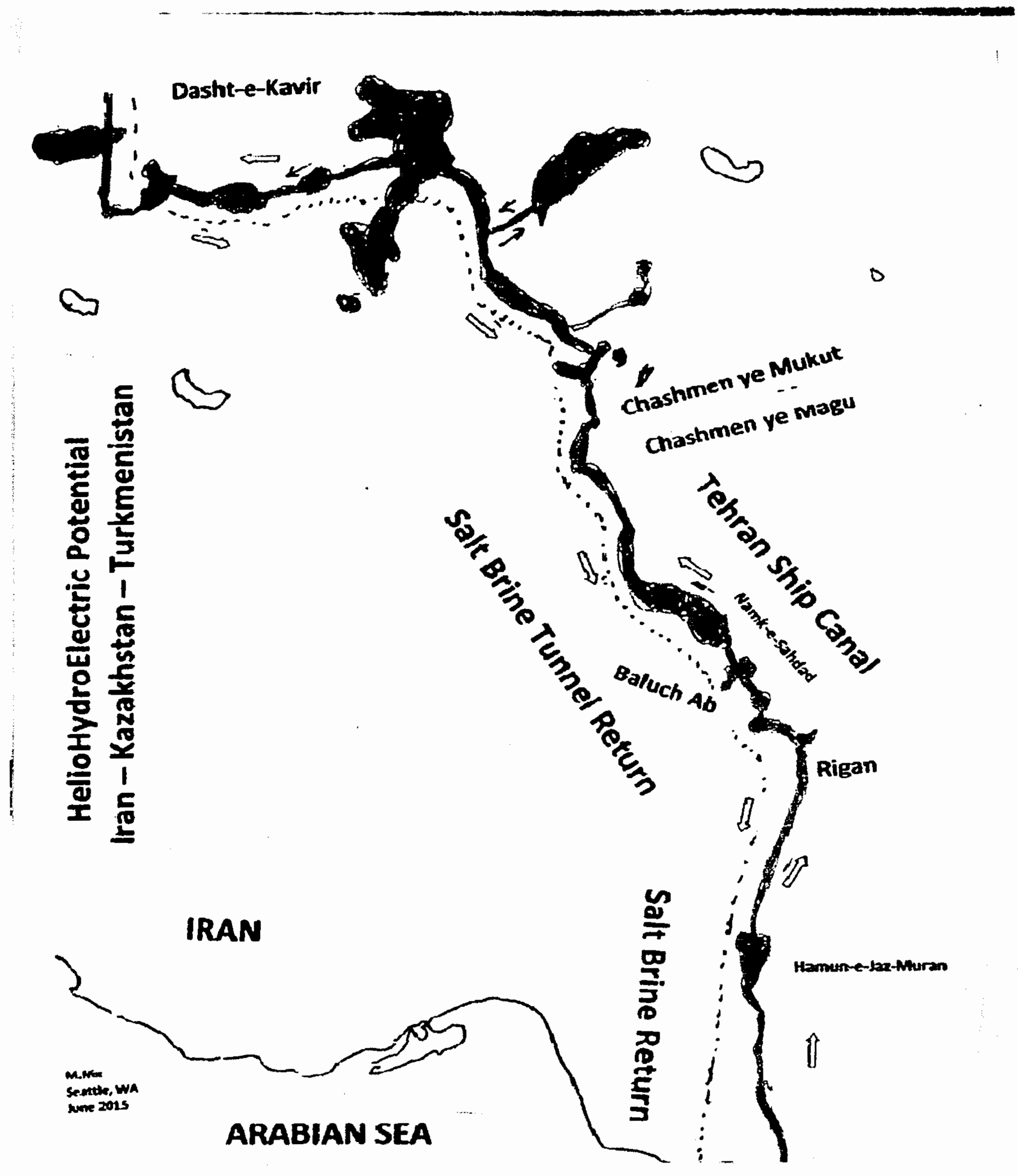
HelioHydroElectric Potential Prefeasibility Study Iran, Turkmenistan, Kazakhstan

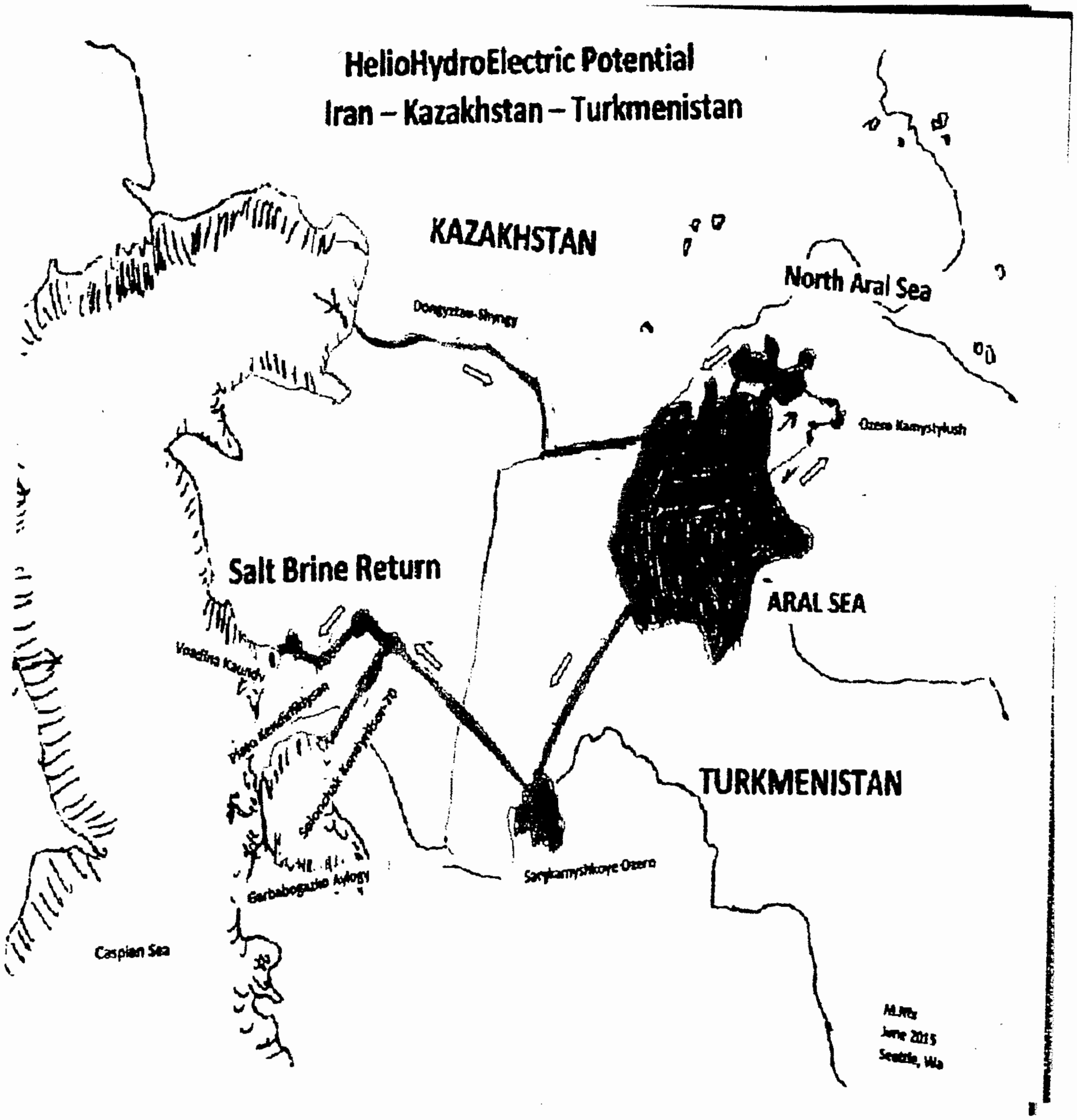
Prepared by Martin Nix B.U.S, A.A.S Seattle, WA, June, 2015

ABSTRACT: HelioHydroElectric is a little known solar engineering technology, using salt/sea water and solar power to create evaporation ponds for artificial rain in deserts. Iran, Turkmenistan and Kazakhstan have large resources. Located in these nations are endorheic dry salt lakes. These can be flooded using solar powered pumps with salt/sea water to create clouds from evaporation. The additional rainfall would increase vegetation, thus removing carbon dioxide from the atmosphere. HelioHydroElectric technology is the only technology that can actually remove carbon dioxide from the atmosphere. The additional rainfall in Iran, Turkmenistan, and Kazakhstan will increase agriculture and provide new living space. It is proposed that the Dasht-e-Kavir, the Caspian and Aral Sea be flooded with seawater. Development of HelioHydroElectric has the potential of also solving energy supply problems in Iran, by spurring development of solar technology, energy self-production, and conservation. Iran is the mist of a drought, caused squarely by Carbon Dioxide emissions. This drought will continue unless Carbon Dioxide is removed. It is proposed that Iran build a ship canal from the Arabian Sea to Tehran and to the Caspian Sea. It is hoped this paper will spur conversations and funding for a full feasibility study.




HelioHydroElectric Potential
Iran – Kazakhstan – Turkmenistan
RUSSIA
KAZAKHSTAN
Black Sea to Caspian Sea Tunnel
Chechnya
Caspian Sea
TURKMENISTAN
Tehran
Dasht-e-Kavir
Chashm e Ab Galon
Tehran Ship Canal
IRAN
PERSIAN GULF
Industrial Center
Seattle, WA


HelioHydroElectric Potential
Iran – Kazakhstan – Turkmenistan
Dasht-e-Kavir
Chashmen ye Mukut
Chashmen ye Magu
Tehran Ship Canal
Salt Brine Tunnel Return
Baluch Ab
Rigan
Salt Brine Return
Hamun-e-Jaz-Muran
IRAN
ARABIAN SEA
M.Nix
Seattle, WA
June 2015



INTRODUCTION: Proposed is the pumping of salt/seawater inland to Iran, Kazakhstan, and Turkmenistan to flood existing dry salt lakes. The resulting evaporation will create clouds, and thus artificial rain. This technology, known as HelioHydroElectric technology, will create more vegetation in the desert, region and in mountains, thus reversing Global Warming. It will stimulate the local economy. Solar pumping technology is now very well developed. This Prefeasibility study is mostly to study the potential for construction of such a project. It is hoped that funding for a complete Feasibility study can be located so as to determine the environmental impact, climate impact, and economic impact along with construction plans and cost. Israel, Jordan and Palestine are presently constructing the Red to Dead Sea project, so as to add additional moisture to the region. Egypt has under study the Qattara Depression project. This is being reviewed elsewhere.

METHODOLOGY: Calculations were conducted to get a general idea of the power consumption required for pumping this large volume of salt/seawater. It should be noted that locating geologic information for these sites is difficult. The author is unfamiliar with the region, and apologizes for any misspellings of locations. Sites were identified. Surface area of these dry lakes was estimated, along with elevation. The evaporation rate is unknown for these locations; however, it was assumed that 1% of the surface area would evaporate per day. Evaporation rate data is unknown; however, it was assumed that each square foot of surface of flooded water had 2,000 btus per day of solar energy. Water boils at 212 degrees. The heat of evaporation is 972 btus/lb. Numerous factors are involved with evaporation rate, including reflection from sunlight, altitude, cloud cover, temperature, and so on. Despite the lack of geologic data, still a lot can be determined, and hopefully it will spur further research. (source of data: Wikipedia)

Haman E Juz Munan

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
100 square miles	1,000 ft.	2,787,840,000 sq. ft.	27,878,400 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft
1,161,600 cu.ft./hr.	19,360 cu.ft/min.	322 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
1,739612,160,000	72,483,840,000	1,208,064,000	2,092,800
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
27,305,359 Watts	27,298,863 Watts	27,298,622 Watts	27, 241,818 Watts

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RIGARI

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
100 square miles	3,000 feet	2,787,840,000 sq. ft.	27,878,400 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft
1,161,600 cu.ft./hr.	19,360 cu.ft/min.	322 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
5,218,836,480,000	217,451,520,000	3,624,192,000	60,278,400
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
81,916,077 Watts	81,896,597 Watts	81,895,866 Watts	81,725,454 Watts

Balach Ab

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
100 square miles	3,000 ft.	278,784,000 sq. ft.	27,878,400 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb.
1,161,600 cu.ft./hr.	19,360 cu.ft./min.	322 cu.ft./sec.	62.42769 lb./cu.ft

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
5,218,836,480,000	217,451,520,000	3,624,192,000	60,278,400
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
81,916,077 Watts	81,896,591 Watts	81,895,866 Watts	81,725,454 Watts

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Namakzar-e-Shabad

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
1,000 square miles	4,000 ft.	27,878,400,000 sq. ft.	278,784,000 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb.
11,616,000 cu.ft./hr.	193,600 cu.ft/min.	3,226 cu.ft./sec.	62.42769 lb./cu.ft

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
69,584,486,000,000	2,899,353,600,000	48,322,560,000	805,209,600
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
1,091,963,853 Watts	1,091,954,553 Watts	1,091,944,888 Watts	1,091,703,176 Watts

Chashmeh-Y-Ab-E-Garm

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
2,000 square miles	4,000 ft.	55,756,800,000 sq. ft.	557,568,000 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft
23,232,000 cu.ft./hr.	387,200 cu.ft/min.	6,453 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
139,168,972,800,000	5,798,707,200,000	96,645,120,000	1,610,668,800
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
2,184,428,726 Watts	2,183,909,106 Watts	2,183,889,777 Watts	2,183,744,759 Watts

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Chashmen-Ye-Magu

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
100 square miles	4,000 ft.	2,787,840,000 sq. ft.	27,878,400 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft
289,935,360,000 cu.ft./hr.	4,832,256,000 cu.ft/min.	80,371,200 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
6,958,448,640,000	289,935,360,000	4,832,256,000	80,371,200
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
109,221,436 Watts	109,195,455 Watts	109,194,488 Watts	108,967,273 Watts

Dasht-e-Kavir-East

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
20,000 square miles	4,265 ft.	557,568,000,000 sq. ft.	5,575,680,000 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft
5,575,680,000 cu.ft./hr.	232,320,000 cu.ft/min.	3,872,000 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
1,483,889,172,000,000	61,828,715,520,000	1,030,478,592,000	17,174,554,990
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
23,291,471,290 Watts	23,285,930,840 Watts	23,285,724,740 Watts	23,285,261,660 Watts

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Dasht-e-Kavir West

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
5,000 square miles	4,265 ft.	139,392,000,000 sq. ft.	1,393,920,000 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft
58,080,000 cu.ft./hr.	968,000 cu.ft./min.	16,133 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
370,972,293,100,000	15,457,178,800,000	257,619,648,000	4,293,660,800
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
5,822,867,824 Watts	5,821,482,680 Watts	5,821,431,186 Watts	5,821,422,384 Watts

Extension into Kazakhstan and Turkmenistan: The Caspian Sea is below sea level. Thus little energy would be required to pump sea water inland. The ocean has higher salinity than the Caspian Sea. However, the additional evaporation from the Caspian Sea will put more fresh rainwater into the sea, thus offsetting. The Ural Sea is now officially dry, with no water. The water has been diverted for agriculture. However, the Ural Sea is not that high above sea level. It takes more energy to move water uphill than across the land. Thus, flooding the Ural Sea with ocean water is not that energy intensive, just that the pipe/canal has to be long. Development of HelioHydroElectric in this region would provide the nations of Kazakhstan and Turkmenistan extensive rainfall, thus reversing Global Warming. There are two routes for providing ocean water to the Caspian Sea: Via Chechnya, in Russia and via Iran. It is proposed that the Tehran Ship Canal be extended to the Caspian Sea. It is proposed that a deep underground tunnel be built from the Caspian Sea to return Salt Brine, thus allowing the HelioHydroElectric project to last from generation to generation. There are ways of separating more dense salt water from less dense water.

Aral Sea (Ural Sea)

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
26,300 square miles	**138 ft.**	**733,320,192,000 sq. ft.**	**7,332,019,200cu.ft./day**

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb.
305,500,800 cu.ft./hr.	**5,091,680 cu.ft./min.**	**84,861 cu.ft./sec.**	**62.42769 lb./cu.ft**

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
63,137,483,740,000	**2,630,728,489,000**	**43,845,474,820**	**730,755,043**
X 0.00001569623374	**X .000376616097**	**X .0225969658**	**X 1.35581795**
990,774,697 Watts	**990,774,695 Watts**	**990,774,695 Watts**	**990,770,804 Watts**

Sarykamyshkoye

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
1,930 square miles	49 ft.	53,805,312,000 sq. ft.	538,053,120 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft
22,418,880 cu.ft./hr.	373,648 cu.ft/min.	6,227 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
1,645,152,200,000	68,547,967,490	1,142,466,125	19,039,675
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
25,822,678 Watts	25,816,267 Watts	25,816,267 Watts	25,814,333 Watts

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Caspian Sea

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
143,200 square miles	-92 ft.	3,992,186,880,000 sq. ft.	39,921,868,800 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft
1,663,411,200 cu.ft./hr.	27,723,520 cu.ft./min.	462,058 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
229,183,464,400,000	9,549,311,017,000	159,155,183,600	2,652,582,566
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
-3,597,317,227 Watts	-3,596,461,515 Watts	-3,596,429,684 Watts	-3,596,371,443 Watts

Note: Caspian Sea is below sea level. Thus generates electrical power.

SUMMARY OF RESULTS

	POWER	FLOW RATE@ 10 ft./sec.	EVAPORATION RATE
Haman E Juz Munan	27.2 MegaWatts	32.2 cu.ft./sec.	27,878,400 cu.ft./day
Rigari	81.8 MegaWatts	32.2 cu.ft./sec.	27,878,400 cu.ft./day
Baluch Ab	81.8 MegaWatts	32.2 cu.ft./sec.	27,878,400 cu.ft./day
Namakzar-e-Shabad	1,091.9 MegaWatts	322.6 cu.ft./sec.	278,784,000 cu.ft./day
Chashmeh-Y-Ab-E-Garm	2,183.5 MegaWatts	645.3 cu.ft./sec.	557,568,000 cu.ft./day
Chashmen-Ye-Magu	109.0 Megawatts	32.2 cu.ft./sec.	27,878,400 cu.ft./day
Dasht-e-Kavir - East	23,285.5 Megawatts	6453.3 cu.ft./sec.	5,575,680,000 cu.ft./day
Dasht-e-Kavir - West	5,822.5 Megawatts	1613.3 cu.ft./sec.	1,393,920,000 cu.ft./day
Aral (Ural) Sea	990.7 Megawatts	8486.1 cu.ft./sec.	7,332,019,200 cu.ft./day
Sarykamyshkoye	25.8 Megawatts	622.7 cu.ft./sec.	538,053,120 cu.ft./day
TOTAL:	33,699 Megawatts *	18,272.1 cu.ft./sec.	15,832,537,920 cu.ft./day
Caspian Sea	-3,596 Megawatts *	46,205.8 cu.ft./sec.	39,921,868,800 cu.ft./day
GRAND TOTAL:	30,103 Megawatts*	64,477.9 cu.ft./sec.	55,754,406,720 cu.ft./day

.* Total does not include inefficiencies, such as transmission loses, water turbine efficiencies, electric motor heat loss, friction in pipes or canals, and so on.

Amount of rain fall generated per day (at 1% evaporate rate per square mile) :

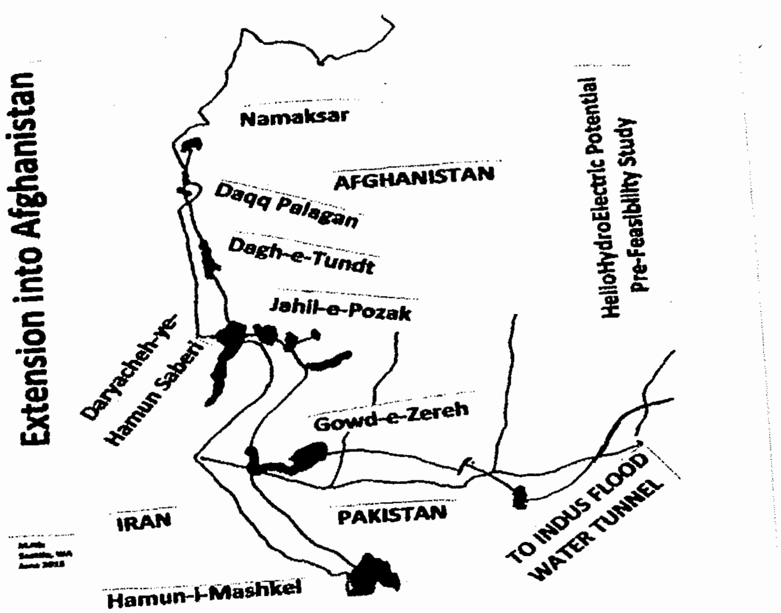
20,350,358,450,000 cu.ft./year
138.3 cubic miles of rainfall/year
Covering 729,968 square miles with 1 foot of rainfall per year.

WATER PIPE DIAMETER OR CANAL SIZE: Assuming the flow rate of the water in the pipe and/or canal is 10 ft. per second, the canal size would be 253 ft. by 253 ft. Or 506 ft. by 126 ft. deep. If a pipe is used, the pipe diameter would be about 285 ft. in diameter (if one big pipe). It is undetermined the amount of concrete required for building, however, this can be calculated. Construction cost, labor and schedules can also be determined as part of the Feasibility study. It should be noted that canals can silt up in a dust storm. Pipes can handle pressure better and have faster flow rates.

FLUSHING SALT BRINE: It is proposed that an underground tunnel or pipe be built, using either cut-and-cover technology, or deep bore tunneling. The construction of these Salt Brine Tunnels will flush salt from the evaporation lakes, thus extending their useful lives. The ocean is approximately 3% salt. Concentrated salt brine (i.e. 27%) can then be piped back to the ocean. There are ways of separating concentrated salt brine from fresh water. These Salt Brine Tunnels would parallel the planned canal/pipes, and would be smaller diameter. The major purpose of these smaller diameter pipes is transportation of concentrated salt.

MICROCLIMATE EFFECT: It should be noted that once these salt dry lakes are flooded with salt water, the evaporation from rain water builds up in the surrounding mountains and plains. Fresh rain water is locked up in plants, fresh water lakes, and underground aquifers. Plants and trees also add moisture to the air. Each year, the evaporation is cumulative. The first year, for example, one cubic mile of fresh rain water is added to the environment, the next year another cubic mile, the year following another cubic mile. Gradually moisture builds up in the local environment. A review of the climate data of the Great Salt Lakes in Utah would give an estimate of the climate impact.

IMPACT BY IRAN ON PASKISTAN: It should be noted that Pakistan is also considering HelioHydroElectric development. Proposed is a diversion tunnel from the Indus River flood dry salt lakes in Afghanistan and Pakistan. Also, salt water from the Arabian Sea would be pumped inland to flood these dry salt lakes along the border of Iran and Pakistan and Afghanistan. (It should be noted that Afghanistan is bound to export 910 cubic feet of water per second to Iran along the Helman River). The Rann of Kutch region is also proposed to be flooded. By adding additional seawater for evaporation, this will provide more rain water for Pakistan, Afghanistan and India. A separate Prefeasibility study is being prepared for Pakistan, Afghanistan and India.



IMPACT ON GLOBAL WARMING: The additional rainfall in the desert should increase the amount of vegetation. The vegetation will remove carbon dioxide from the atmosphere. With the upcoming treaty conference in Paris, in December, a HelioHydroElectric Treaty can be developed between India, Pakistan, Iran and Afghanistan. The treaty would offset carbon dioxide emission. Iran should pursue HelioHydroElectric technology as its course of action to reduce carbon dioxide in the atmosphere.

POWER REQUIREMENTS: The power requirements to pump this large volume of seawater inland are huge. However, this is not impossible. Based on these calculations, close to 20% - 30% of the entire electrical power produced by Iran would pump this large volume of sea water. Iran's electrical capacity was last measured at 199,787 Megawatts in 2011. Nearly 15% of the electrical power was lost from transmission and distribution. Significant amounts was generated from hydropower, which HelioHydroElectric evaporation can supplement. The vast majority of electrical power was from natural gas. While it is beyond the scope of this Prefeasibility study, it is believed by the author that with rapid development of solar energy, and energy conservation was implemented, it would make this electrical power available for salt water pumping. It could supplement and solve the energy crisis in neighboring Pakistan. The list is nearly endless in solar technologies that can be implemented to achieve electricity conservation: solar hot water, solar cooking, solar salt water distillation, solar lighting, micro wind turbines, paddle wheel systems on canals, solar greenhouses, rain barrels, solar smelters, solar water pumping, solar powered air conditioning, night sky radiation refrigeration, biomass conversion, biofuels, energy efficient appliances and so on. This technology would employ people in Iran, and would be a new export industry. A lot of the problem of electrical supply is lack of capacity in the distribution and transmission lines, which HelioHydroElectric development would solve. With better load management, energy self-production, and conservation, it would make electricity available for the HelioHydroElectric projects. The goal would be to have people "make their own energy". Good models to follow are the efforts of Denmark, Netherlands, and Germany.

BETTER LOAD MANAGEMENT OF EXISTING ELECTRICAL SYSTEM: It will be impossible to achieve electrical stability with traditional "flat rates", where everyone pays the same. All electrical power does not cost the same to generate. Nuclear power being the most expensive, while hydro power is often the lowest. Often times the various energy sources for generation for electrical power is averaged, mixing the cost together. By going to a "the more you use, the more you pay" rate structure, it will encourage "mega wasters" to conserve. For example, the first 500 Kilowatts would be 3 cents per Kilowatt, the second 500 Kilowatts would be 6 cents, the next 500 Kilowatts 9 cents, and so on. A low income grandmother, for example, who only uses a small amount for a light and a refrigerator, would only pay a few dollars a month. However, someone with a large mansion, who consumes nearly 100,000 Kilowatts, would pay on upwards to $1000 a month. It would give the mansion owner an incentive to install solar panels, or implement conservation measures. It would employ people installing the equipment. Another option for business would be Time of Day Metering, where in day, when there are shortages of electrical power, a business would pay say, 50 cents per Kilowatt. But at night when electrical is very available, the business could pay only 5 cents per Kilowatt. This gives business a financial incentive to implement conservation and energy self production. It is beyond the scope of this Prefeasibility study to discuss load management, but this could be a method to make electricity available for the large amount of electricity required for pumping for the HelioHydroElectric project.

BIOFUEL PRODUCTION: These flooded salt lakes also have another gift: algae. Algae can be converted to biofuels. Thus creating a new energy source. The Iranian airlines are exceptionally interested in BioJet fuels made from algae.

NATURAL GAS OPTION FOR SEAWATER PUMPING: Natural gas is often used for irrigation pumping. There are sufficient natural gas supplies in the region. Often times it is a waste product from oil production, where natural gas is flared. Natural gas can be used for pumping seawater for the HelioHydroElectric project. The goal is to make this project sustainable from generation to generation in the future. If natural gas is utilized, plans should be implemented for eventual conversion to solar and wind energy. This can be done. For example, solar energy can break down water to hydrogen. It is feasible to convert coal power plants, natural power plants (and even nuclear power plants) to be powered by solar energy. The technology exists. It is unknown if the amount of carbon dioxide generated by natural gas combustion would be offset by the additional vegetation grown, but this can be determined. It will be necessary to use natural gas for construction materials for the project. Concrete for pipes and canals would be need natural gas to power the factories. It should be noted that the heat of exhaust (as from a natural gas generator) or steam from a cooling tower, can evaporate salt water so that it adds additional rainfall to the region.

STATUS OF ENERGY IN IRAN: "Iran is in a constant battle to use its energy resources more effectively in face of subsidization and the need for technological advances in energy exploration and production. Energy wastage in Iran amounts to six to seven billion dollars (2008). The energy consumption in the country is extraordinarily higher than international standards. ... due to high energy subsidies, Iran is one of the most energy inefficient countries in the world..." (Quote Wikipedia).

TRANSPORTATION: Iran is highly dependent on gasoline powered single occupancy vehicles. The nation needs to review more energy efficient, and safer forms of transportation. Economy of scales will be created, thus helping the nation pay for the cost of construction of HelioHydroElectric projects. Better transit, bicycle facilities, alternative fuels, and rail systems need to be developed. It should be noted the construction of the Tehran Ship Canal would allow for transportation of materials for construction of the project. It would allow for barge traffic on the Caspian Sea, thus increasing trade. The invention of "driver less cars" and "drone delivery to postal offices", adds a futuristic aspect. Iran will need to change its transportation system to be more efficient, and less costly.

MILITARY INVOLVEMENT: Iran spends considerable funds on the military. The military should review spending so as to implement dual-use. Dual-use means technology that can be used to stimulate the economy while providing for national defense. For example, a national Bicycle Trail System, where bicycles are separate from car traffic, would conserve fossil fuels. It would provide a low cost, none carbon, form of transportation. It would stimulate the economy. The military can use its corps of engineers to build these projects. The military can assist with manpower on constructing these HelioHydroElectric project. The Medical Corps for example could build and distribute solar cookers and solar salt water distillers to low/no income people. Thus improving the health of children nationwide. The military for example, can assist in better watershed management, such as reforestation. There needs to be recognition that Global Warming is a threat to the national security of Iran. What we need is a Declaration of War on Global Warming, not "nation vs. nation". This can be done. It is official state policy that the Islamic State is a symptom of Global Warming. A lot of the conflict in Syria is caused by the drought, with the carrying capacity of the land strained. Changing the climate so it rains, is the long range solution to the threat the Islamic State presents to Iran. It is beyond the scope of this Prefeasibility study to discuss the involvement of the Iranian military. The Iranian Military does have valuable resources that can be applied.

CONCLUSION: The nation of Iran is strongly encouraged to explore a fossil-fuel-less and a none-nuclear energy future. Instead Iran should explore what other nations have done with development of solar energy and wind energy. HelioHydroElectric development could be that catalyst for such a future. It would create a more equable society where people make their own energy, and a cleaner future. Iran is creating and exporting extensive Carbon Dioxide. As long as this Carbon Dioxide is being added to the atmosphere, the severe drought will continue. Furthermore, nuclear power plants have a known problem of being dangerous. The explosion of one nuclear power plant would spread radiation, affecting the health of nearly 80 million people. While Nuclear power plants last only 50 years, the proposed HelioHydroElectric project will last for generations. Nuclear power plants are threat to the security of Iran. Heavy dependence on dangerous and polluting energy sources will create a society that is violent. Iran does have the resources to build HelioHydroElectric. This is no more visionary than what the Panama Canal was in the 1900s. Going to a renewable energy society will make for a healthy economy, plus, and a more free society.

The emphasis on fossil fuels is adding carbon dioxide to the atmosphere, which is threatening the future of Iran from Global Warming.

HelioHydroElectric development will give Iran a bright economic future and solve the drought.

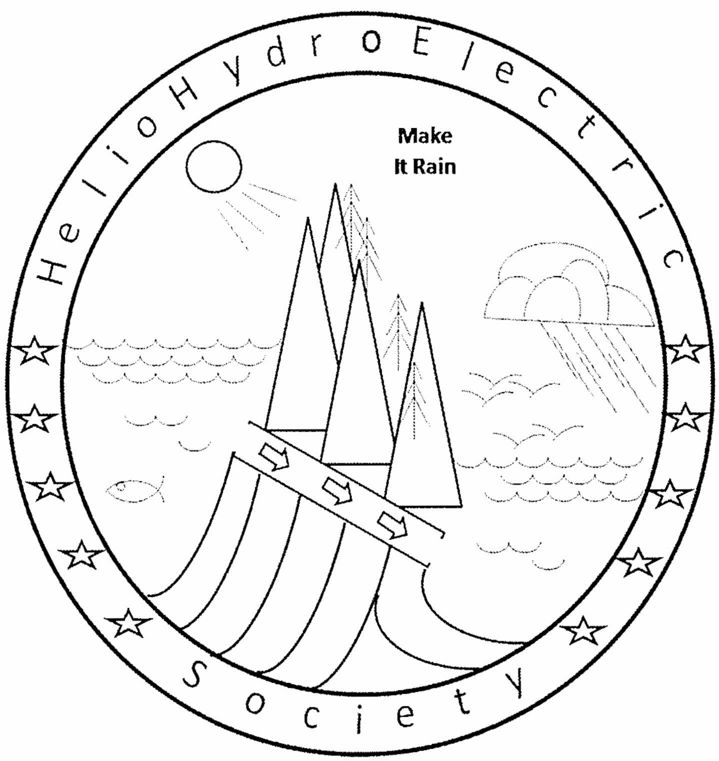
ABOUT THE AUTHOR: Martin Nix is the founding secretary of Solar Washington, a group dedicated to promotion of solar technology in the State of Washington, USA. He has 9 U.S. patents in solar technology. He is a graduate of the University of New Mexico, and North Seattle Community College. He attended the School of Regional Planning and Architecture at UNM, and also the School of Engineering at NMSU. B.U.S., A.A.S.

WEB SITE: www.heliohydroelectric.org

HelioHydroElectric Potential
Prefeasibility Study
MIDDLE EAST

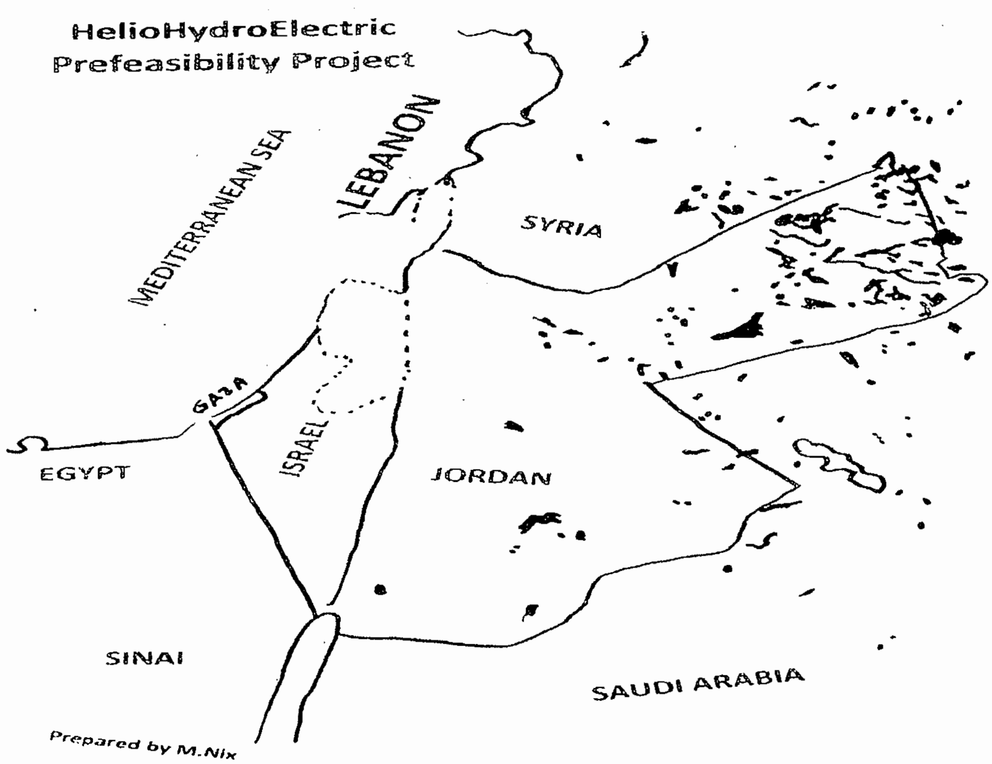
Prepared by Martin Nix B.U.S, A.A.S Seattle, WA, June, 2015

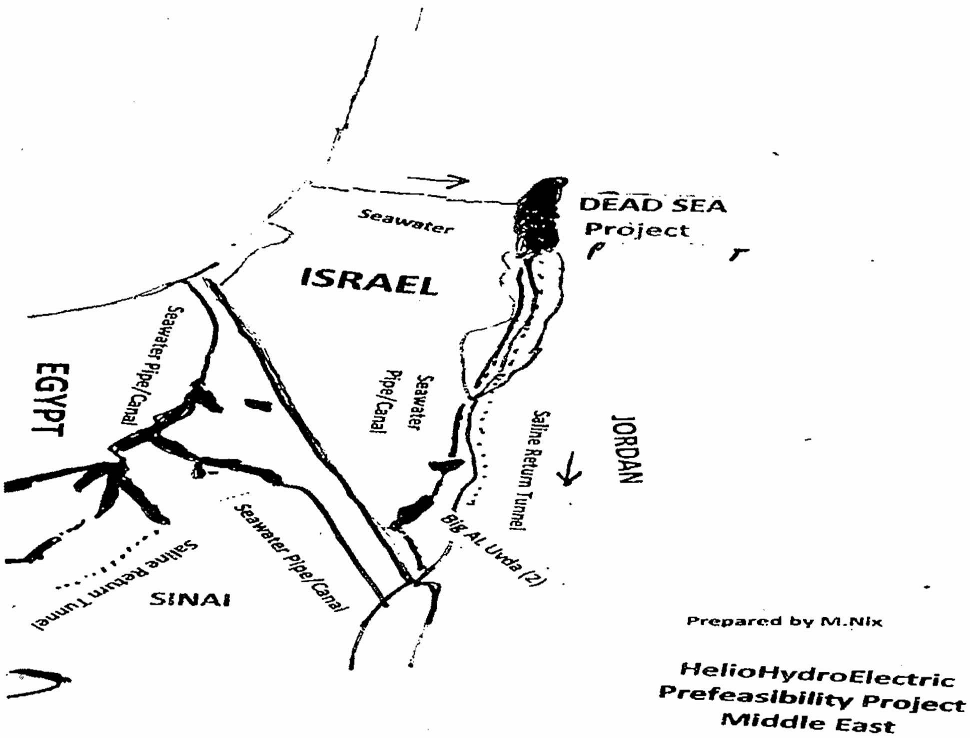
ABSTRACT: HelioHydroElectric is a little known solar engineering technology, using salt/sea water and solar power to create evaporation ponds for artificial rain in deserts. The Middle East has large HelioHydroElectric resources. Located throughout the Middle East are dry endorheic salt lakes. These can be flooded with salt/sea water to create clouds from evaporation. The additional rainfall would increase vegetation, thus removing carbon dioxide from the atmosphere. HelioHydroElectric technology is the only technology that can actually remove carbon dioxide from the atmosphere. The additional rainfall in Middle East will increase agriculture and provide new living space. Not only can salt/sea water be used, but also underground alkali aquifer water can be used to flood these dry salt lakes. It is proposed that wind and solar power be used, along with energy conservation, for water pumping. Development of HelioHydroElectric has the potential of solving the drought problem in the Sahara region. Various sites were graphed for potential. Much of the conflict in this region is caused by the drought. It is being proposed as a military solution to the Islamic State. It is hoped this paper will spur conversations and funding for a full feasibility study.



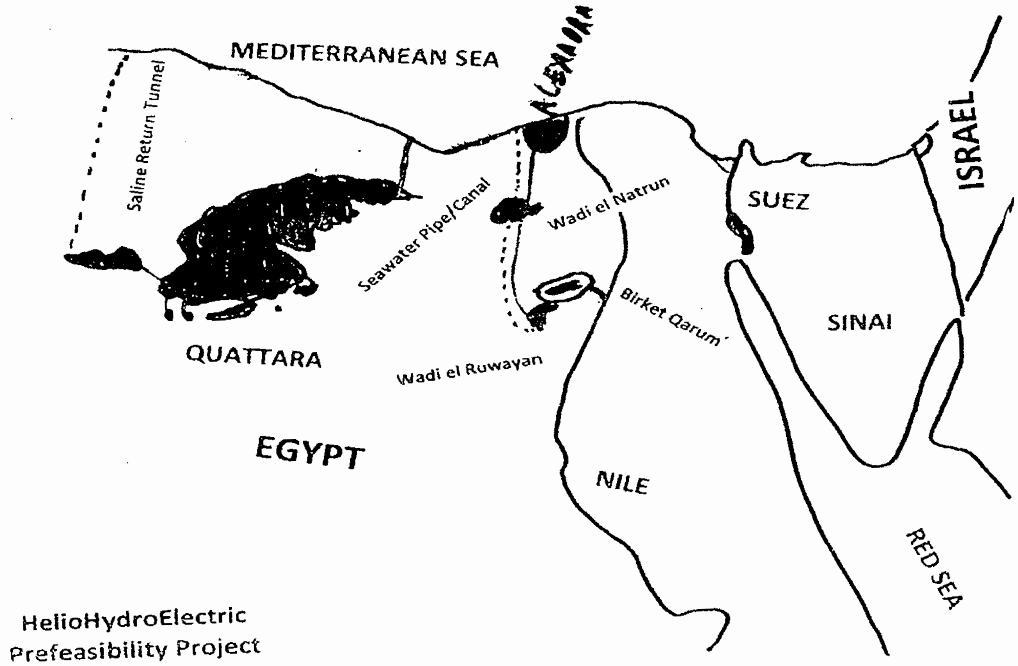
INTRODUCTION: Proposed is the pumping of salt/seawater inland to the various nations in the Middle East for flooding of existing endorheic dry salt lakes to create clouds via evaporation, and thus artificial rain. This technology, known as HelioHydroElectric technology, will create more vegetation in the desert, region and in mountains, thus reversing Global Warming. It will stimulate the economy of the Middle East nations. Solar pumping technology is now very well developed. This Prefeasibility study is mostly to study the potential for construction of such a project. It is hoped that funding for a complete Feasibility study can be located so as to determine the environmental impact, climate impact, and economic impact along with construction plans and cost. Israel, Jordan and Palestine are presently constructing the Red to Dead Sea project, so as to add additional moisture to the region. Egypt has under study the Qattara Depression project. This is being reviewed elsewhere. Iran and Pakistan are considering HelioHydroElectric projects, with HelioHydroElectric Society assistance. There has been much unrest in the Middle East, in a large part due to the drought, caused by Global Warming. It is proposed that HelioHydroElectric be a military solution to the Islamic State. By changing the climate of the region so there is more water, it should help eliminate much of the poverty created by lack of water. These graphics illustrate potential locations for HelioHydroElectric development for further study.

SPECIAL NOTE: The author found it exceptionally difficult to obtain accurate geologic data for the region. In some cases it was not existent. Consequently, method of estimation was used, with "best guess" data used. The Author is unfamiliar with the region, so deeply apologizes for the numerous misspellings for locations. In some cases the dry salt lakes did not have names, simply "salt lake". However, by reviewing this, it will spur a more comprehensive analysis of the region's geology.





		ISRAEL		
Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Dead Sea	233	64,956,672 Cubic Feet/Day	751 Cubic Feet/Second	-89MW
Big Al Uvda	100	27,878,400	322	-8
Total:	333	92,835,072	1,073	-97MW

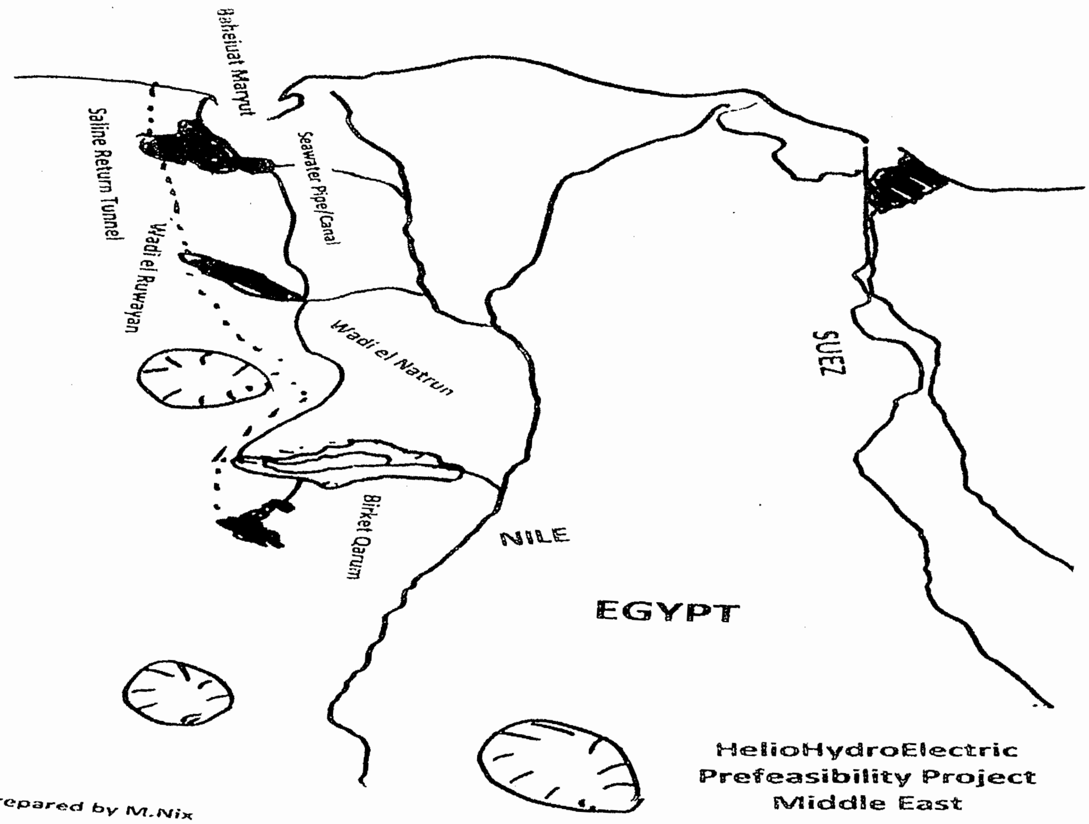


EGYPT

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Toshka	502	139,949,568 Cubic Feet/Day	1,619 Cubic Feet/Second	82MW
Total:	502	139,949,568	1,619	82MW

EGYPT (Below Sea Level)

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
SIWA	100	27,878,400 cu/ft/day	322 cu/ft/s	-1MW
Birket Qarun	490	136,600,416	1,581	-18
Wadi Natrum	100	27,878,400	322	-2
Wadi Ruwayan	200	55,756,800	645	-1
Qattara	7,570	2,110,394,880	24,425	-901
Total:	8,460	2,135,205,890	27,295	-923MW

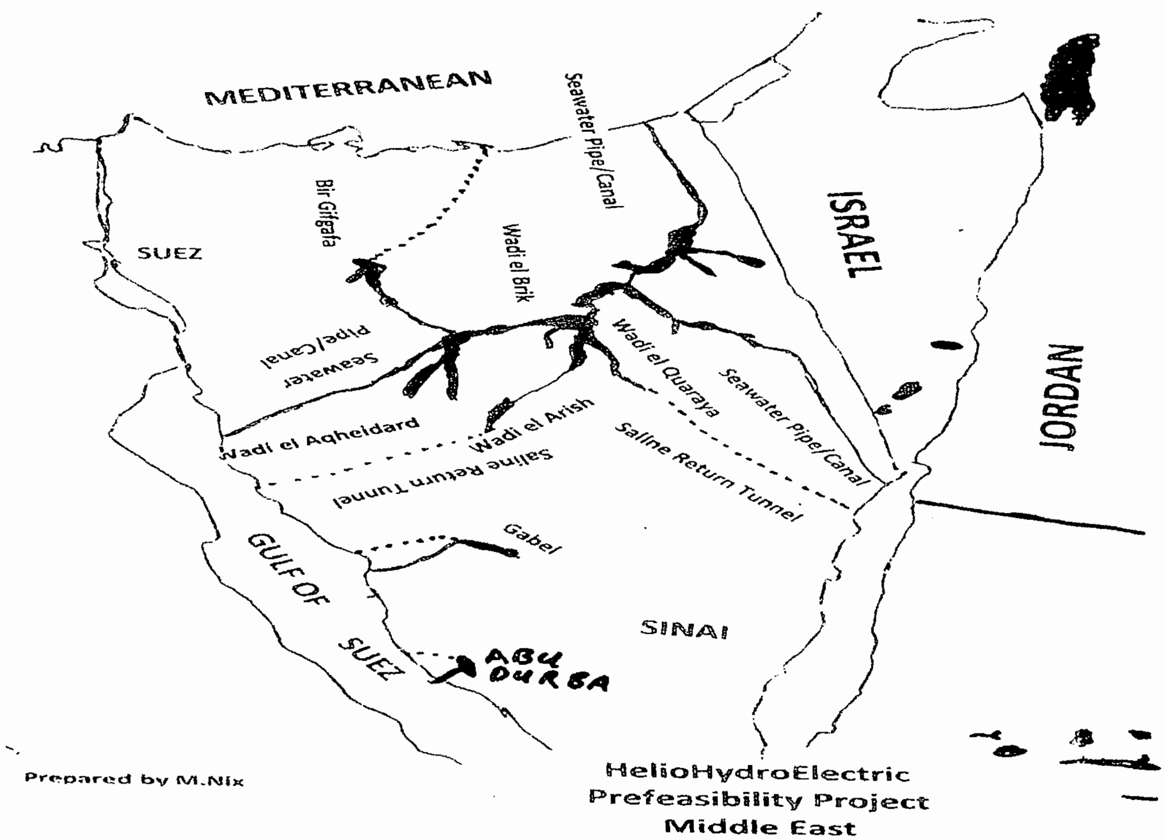

Baheiuat Maryut
Saline Return Tunnel
Seawater Pipe/Canal
Wadi el Ruwayan
Wadi el Natrun
SUEZ
Birket Qarum
NILE
EGYPT
HelioHydroElectric
Prefeasibility Project
Middle East
Prepared by M.Nix

LIBYA

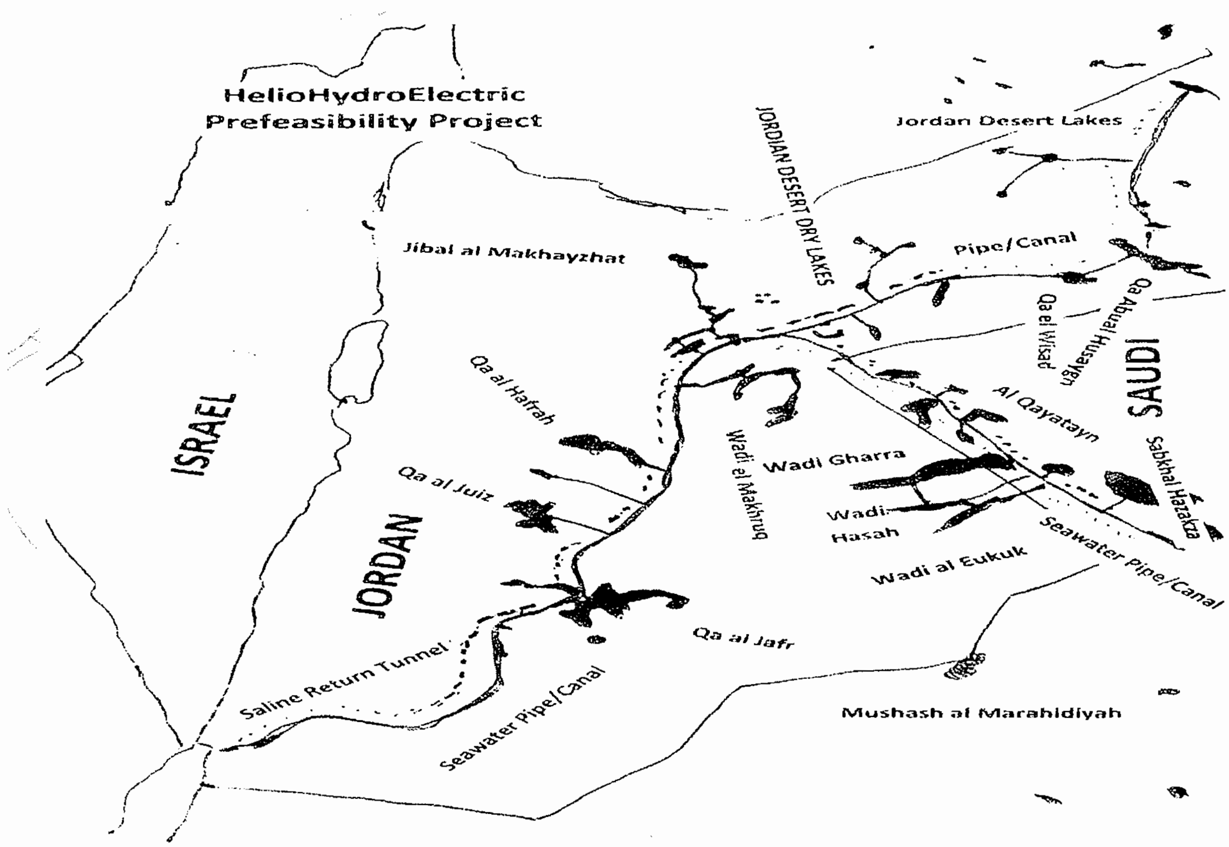
Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Misc.Sites	1,000	278,878,400 cu/ft/day	3,226 cu/ft/s	546MW
Total:	1,000	278,878,400	3,226	546

LIBYA (Below Sea Level)

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Ghurzayif	100	27,878,400 cu/ft/day	322 cu/ft/s	-4MW
Jaghbub	100	27,878,400	322	-1
Total:	200	55,756,800	644	-5MW

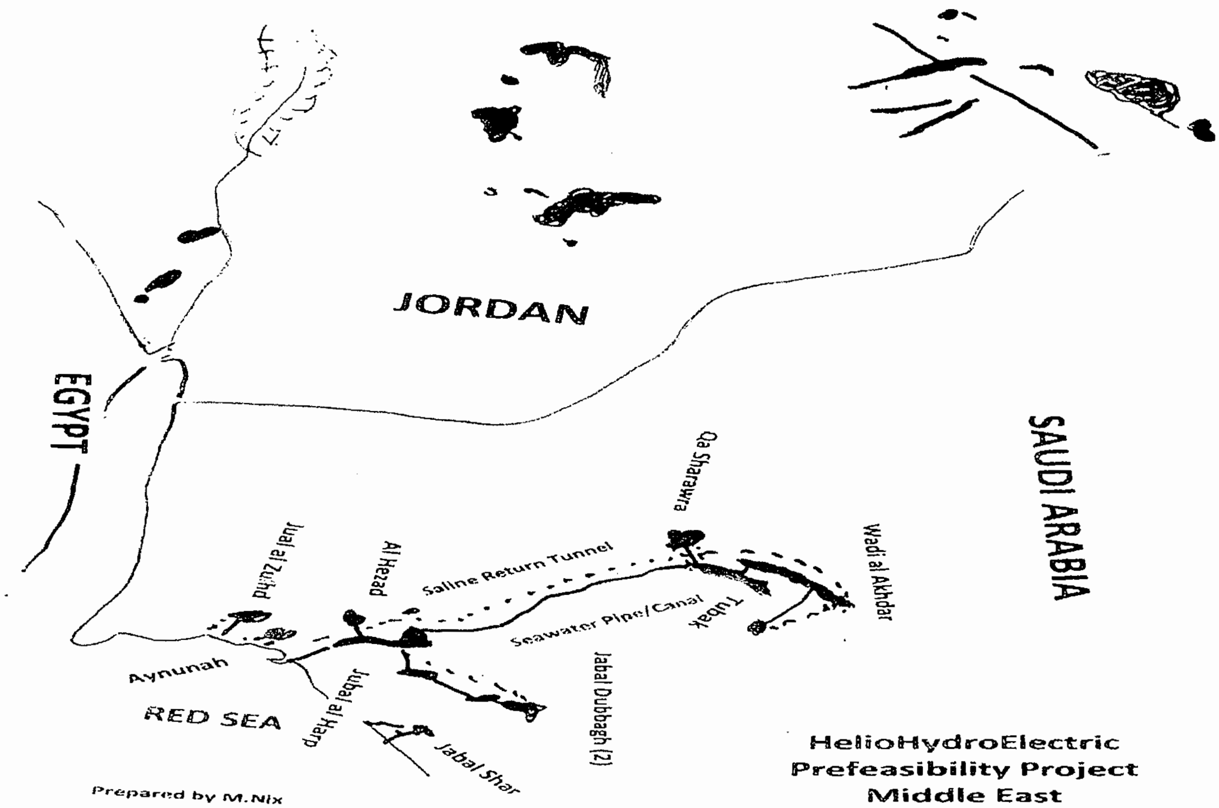


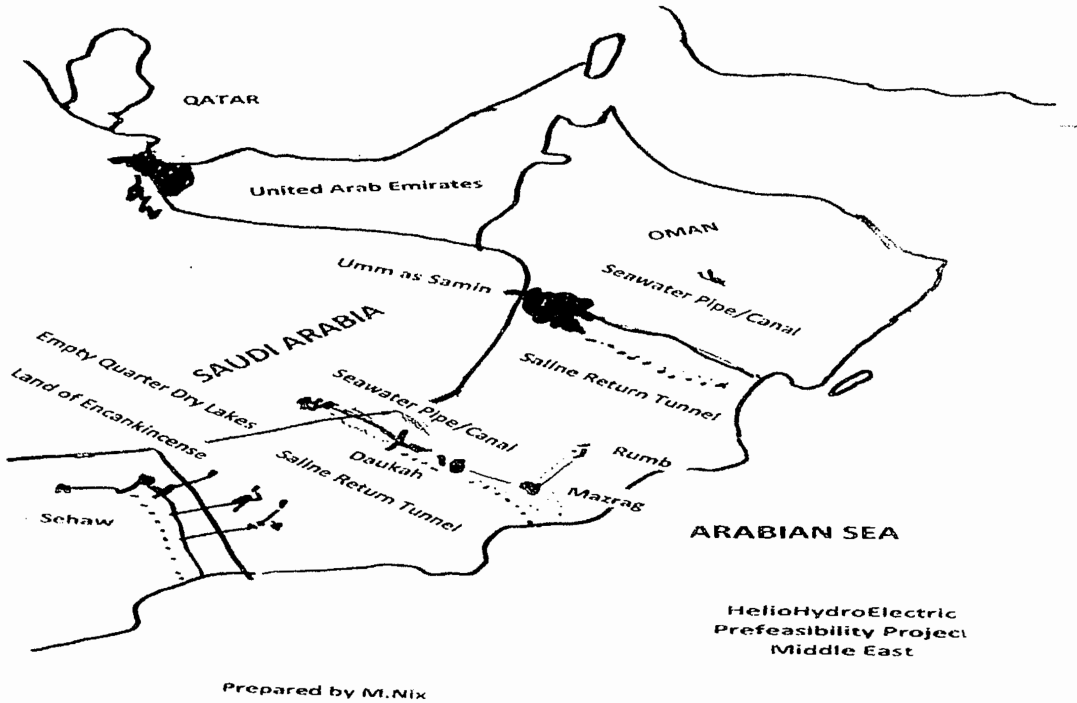
Location	Square Miles	SINAI Evaporation Rate/Day	Evaporation Rate/Second	Power
Wadi Arish	100	27,787,840	322	27
Abu Durba	100	27,787,840	322	27
Wadi Quaraya	200	55,756,800	645	54
Wadi Burk	200	55,756,800	645	54
Gabel	200	55,756,800	645	54
Bir Gifgafu	200	55,756,800	645	54
Solar Lake	500	139,392,000	1,613	1
Burdawil	270	75,271,680	871	1
Total:	1,770	493,266,560	5,708	272MW



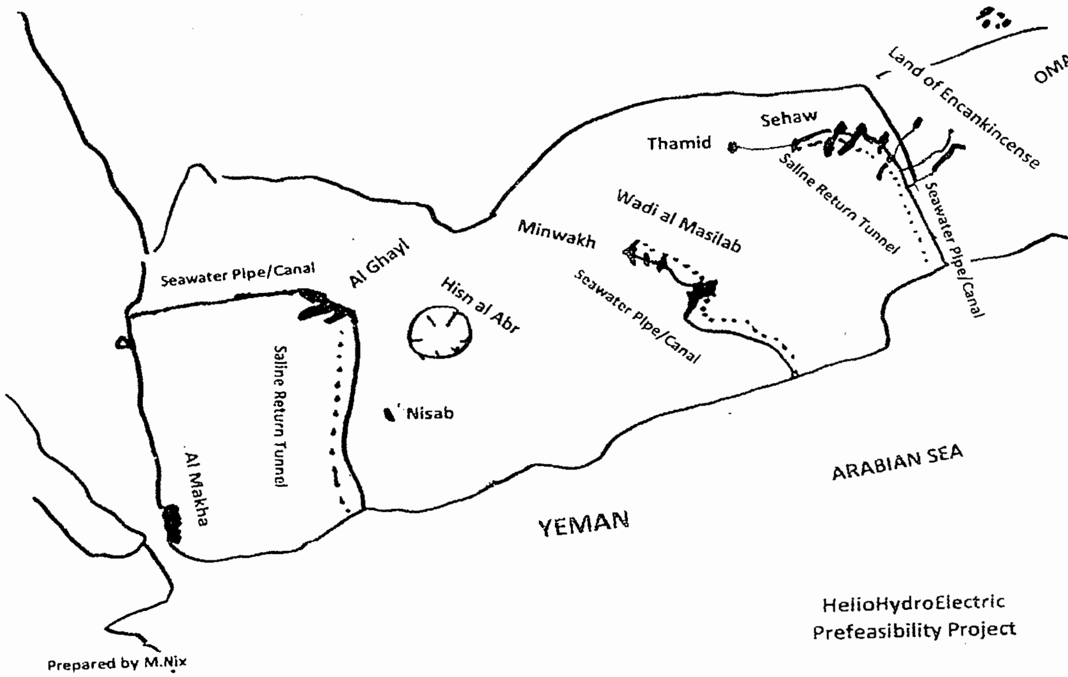
JORDAN

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Qa al Juiz	100	27,787,840 Cubic Feet/Day	322 Cubic Feet/Second	27MW
Al El Hafrah	100	27,787,840	322	27
Qa Abu Husayn	100	27,787,840	322	27
Qa al Qutaf	100	27,787,840	322	27
Qa al Wisad	100	27,787,840	322	27
Wadi Gharra	100	27,787,840	322	27
Wadi al Eukuh	100	27,787,840	322	27
Marahidiyah	100	27,787,840	322	27
Misc.Sites	1,000	278,784,000	3,226	546
Total:	**1,800**	**501,086,720**	**5,802**	**762MW**

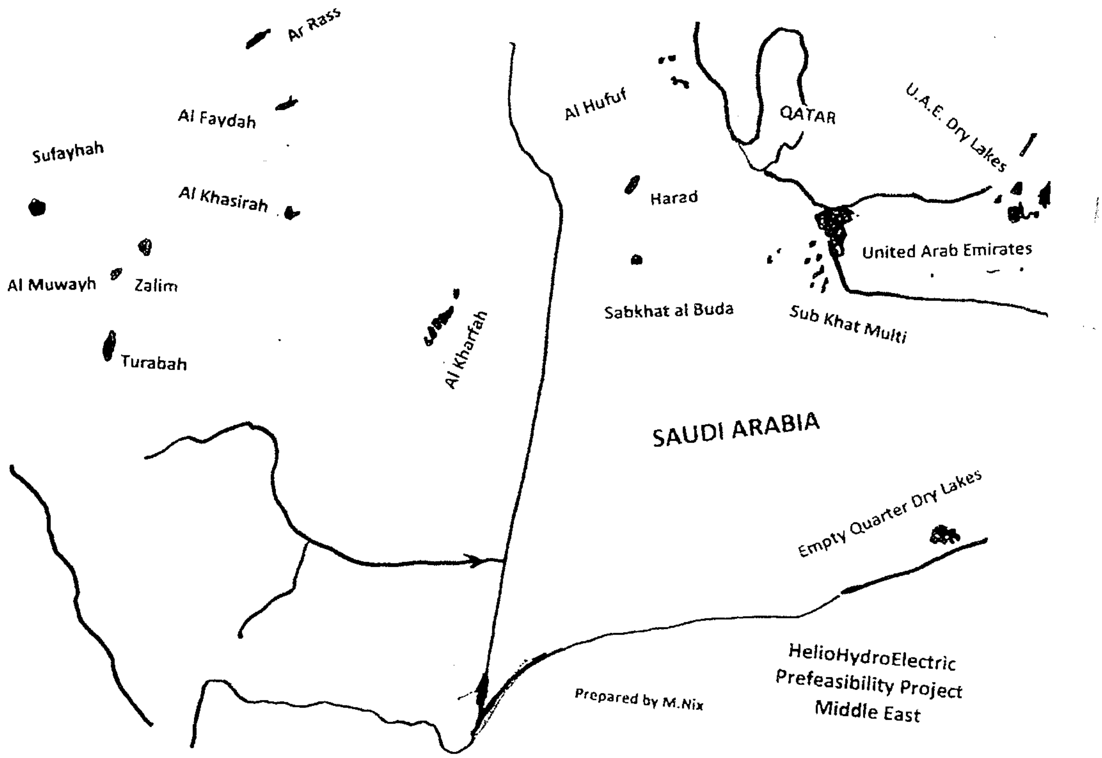




Location	Square Miles	Oman Evaporation Rate/Day	Evaporation Rate/Second	Power
Mazrag	100	27,787,400 cu/ft/day	322 cu/ft/s	81 MW
Rumb	100	27,787,400	322	81
Umm as Salin	1,000	278,878,400	3,226	819
Daukah	300	83,652,000	968	81
Land Encankicese	300	83,652,000	968	491
Misc.Sites	1,000	278,878,400	3,226	546
Total:	2,800	780,635,600	9,032	2,099MW



		Yeman		
Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Al Mikha	100	27,878,400 cu/ft/day	322 cu/ft/s	8MW
Al Ghayl	200	55,756,800	645	327
Minwakh	100	27,878,400	322	163
Wadi Masilab	300	83,635,200	968	491
Thamid	100	27,878,400	322	163
Sehaw	300	83,635,200	968	491
Misc.Sites	1,000	278,878,400	3,226	54
Total:	2,100	501,905,600	6,773	1,697MW

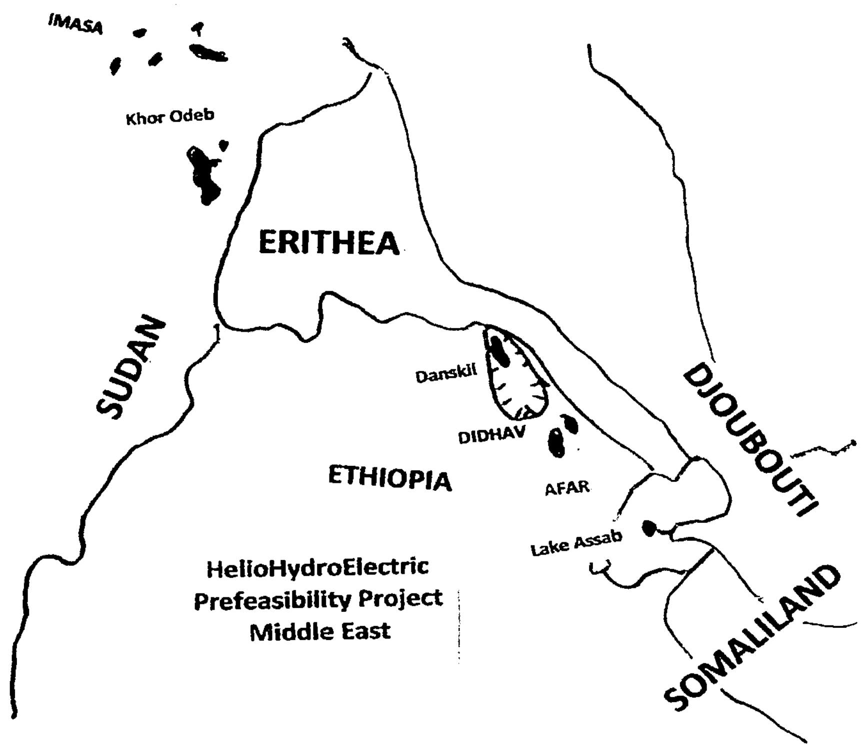

Ar Rass
Al Faydah
Sufayhah
Al Khasirah
Al Muwayh
Zalim
Turabah
Al Kharfah
Al Hufuf
QATAR
U.A.E. Dry Lakes
Harad
United Arab Emirates
Sabkhat al Buda
Sub Khat Multi
SAUDI ARABIA
Empty Quarter Dry Lakes
HelioHydroElectric
Prefeasibility Project
Middle East
Prepared by M.Nix

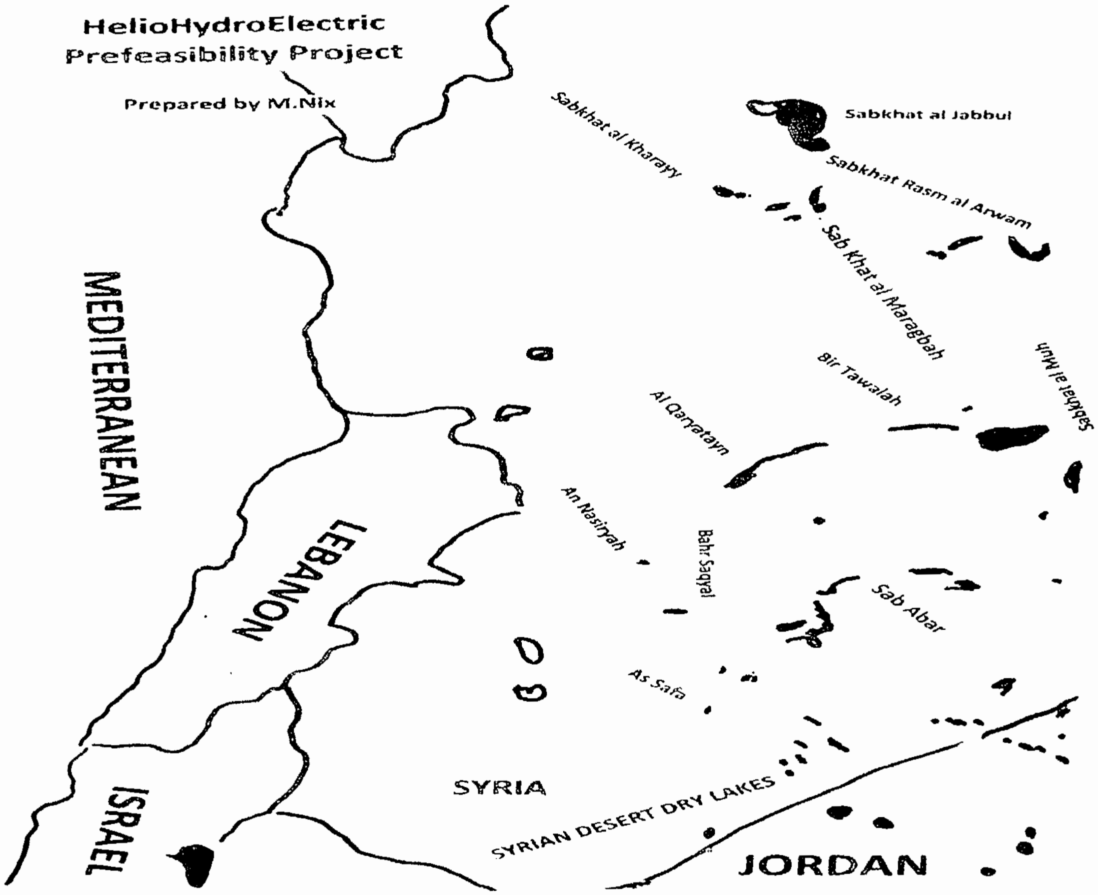
Saudi Arabia

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Empty Quarter	200	55,756,800	645	100MW
Qa Sharaura	100	27,878,200	322	27
Jabal Qubbagh	100	27,878,200	322	27
Wadi Al Akhar	100	27,878,200	322	27
Wadi Tuthlith	100	27,878,200	322	27
Wadi Bishahi	100	27,878,200	322	27
Wadi Hanifa	300	83,635,200	968	81
Wadi Risha	100	27,878,400	322	27
Wadi Rummah	370	103,150,080	1,193	100
Wadi al Lith	100	27,878,400	322	27
Wadi Sadiyah	100	27,878,400	322	27
Wadi Fatimah	100	27,878,400	322	27
Wadi Rbigh	100	27,878,400	322	27
Wadi al Agig	100	27,878,400	322	27
Wadi al Jizi	100	27,878,400	322	27
Wadi as Surr	100	27,878,400	322	27
Wadi Jumi	100	27,878,400	322	27
Al Quyatay	100	27,878,400	322	54
Sabkhal Hazakza	200	55,756,800	645	109
Misc.Sites	1,000	278,878,400	3,226	546
Total:	3,570	577,177,280	6,677	1,368MW

U.A.E.

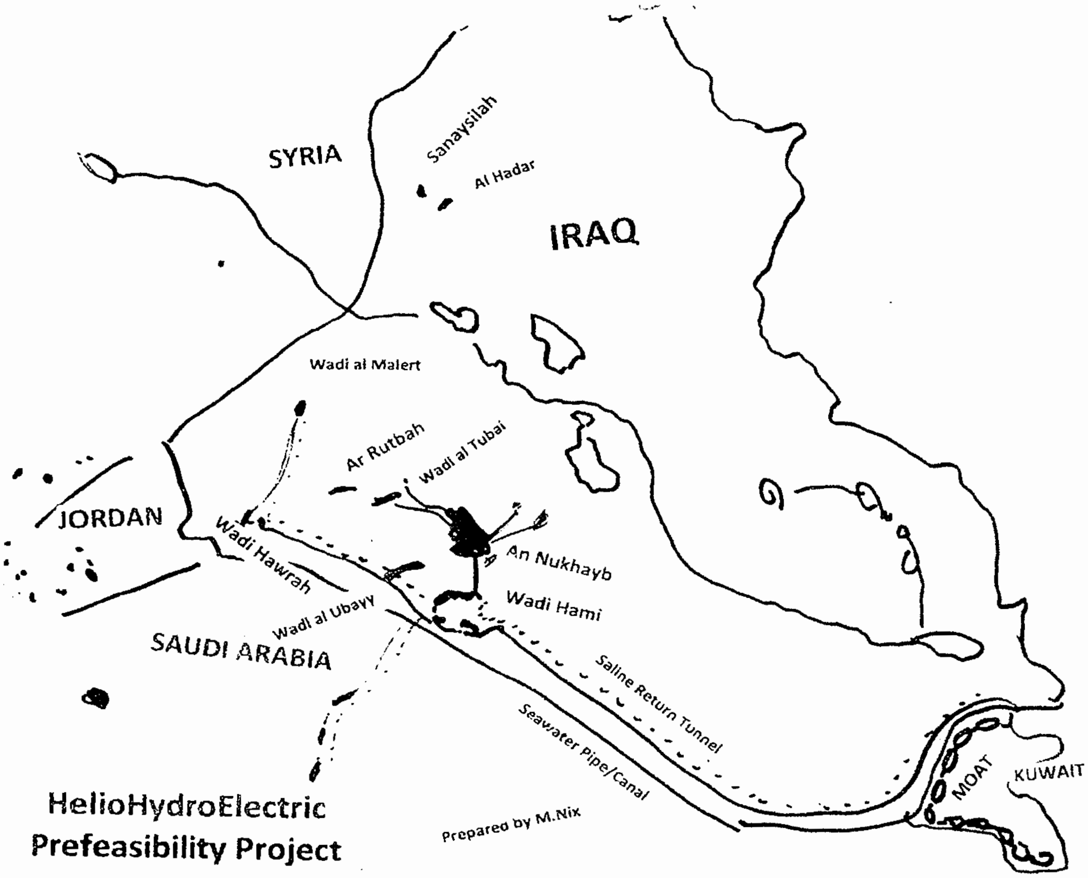
Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Subkhart Matti	100	27,878,400 cu/ft/day	322 cu/ft/s	1MW
Dry Lakes (East)	100	27,878,400	322	13
Total:	200	55,756,800	644	14MW


IMASA
Khor Odeb
ERITHEA
SUDAN
Danskil
DIDHAV
ETHIOPIA
AFAR
Lake Assab
DJOUBOUTI
SOMALILAND
HelioHydroElectric
Prefeasibility Project
Middle East



SYRIA

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Wadi Saba	100	27,878,400 cu/ft/day	322 cu/ft/s	27MW
Wadi Fair	100	27,878,400	322	27
Wadi as Sirhan	100	27,878,400	322	27
Wadi Hamir	100	27,878,400	322	27
Wadi Arar	100	27,878,400	322	27
Wadi Batin	300	83,535,200	968	81
Sabkhat Jubbul	38	20,066,006	232	19
Misc.Sites	1,000	278,878,400	3,226	546
Total:	1,838	521,871,606	7,036	781MW



IRAQ

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Wadi Hawrah	100	27,878,400	322	100MW
Wadi Hami	100	27,878,400	322	100
Wadi al Tubal	100	27,878,400	322	100
An Nukhyab	1,000	278,784,000	3,226	546
Wadi al Ubayy	200	55,575,800	645	300
Ar Rutbah	200	55,575,800	645	300
Wadi al Malert	100	27,787,400	322	100
Misc.Sites	1,000	278,784,000	3,226	546
Total:	2,800	780,233,200	9,030	2,092MW

TURKEY

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Misc.Sites	1,000	278,784,000 cu/ft/day	3,226 cu/ft/s	546MW
Total:	1,000	278,784,000	3,226	546MW

SUMMARY

MIDDLE EAST (Above Sea Level)

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Total:	19,301	4,909,545,329 cu/ft/day	58,773 cu/ft/s	10,277 MW

MIDDLE EAST (Below Sea Level)

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Total:	8,993	2,283,797,762 cu/ft/day	29,012 cu/ft/s	-1,025MW

MIDDLE EAST (Above and Below Sea Level)

Location	Square Miles	Evaporation Rate/Day	Evaporation Rate/Second	Power
Grand Total:	28,294	7,193,343,091 cu/ft/day	87,785 cu/ft/s	10,277-1,025= 9252MW

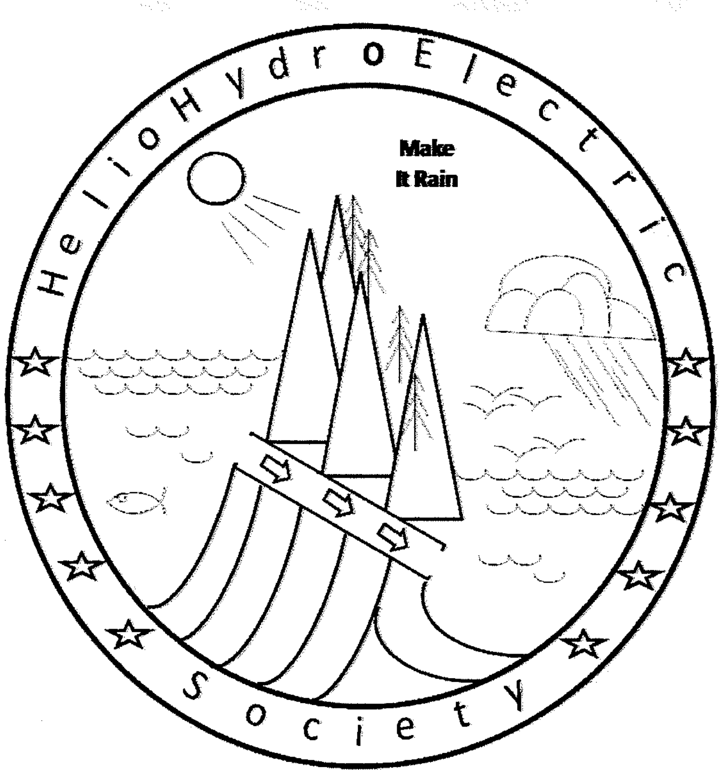
HelioHydroElectric Potential

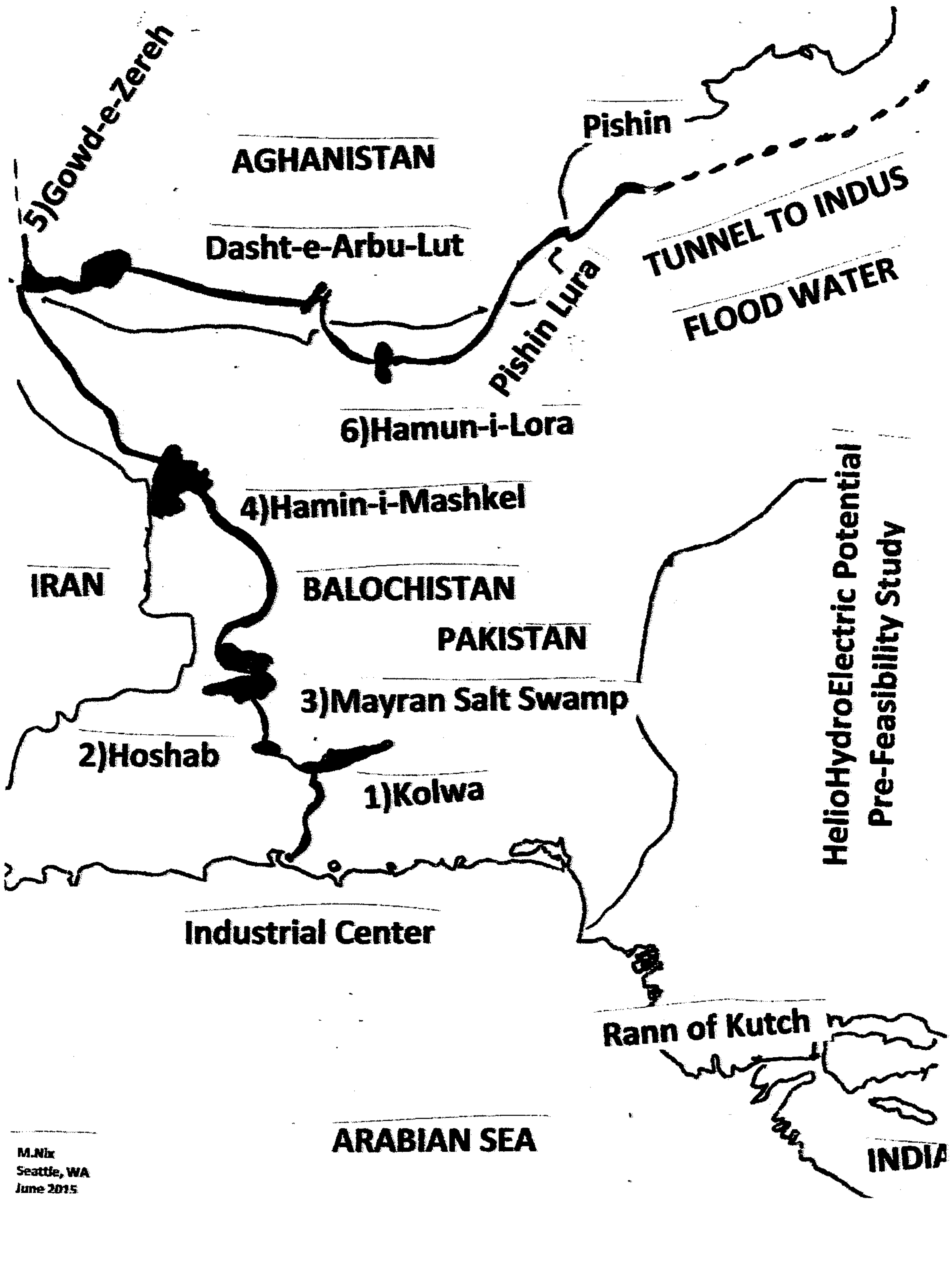
Prefeasibility Study

Pakistan and Afghanistan

Prepared by Martin Nix B.U.S, A.A.S Seattle, WA, June, 2015

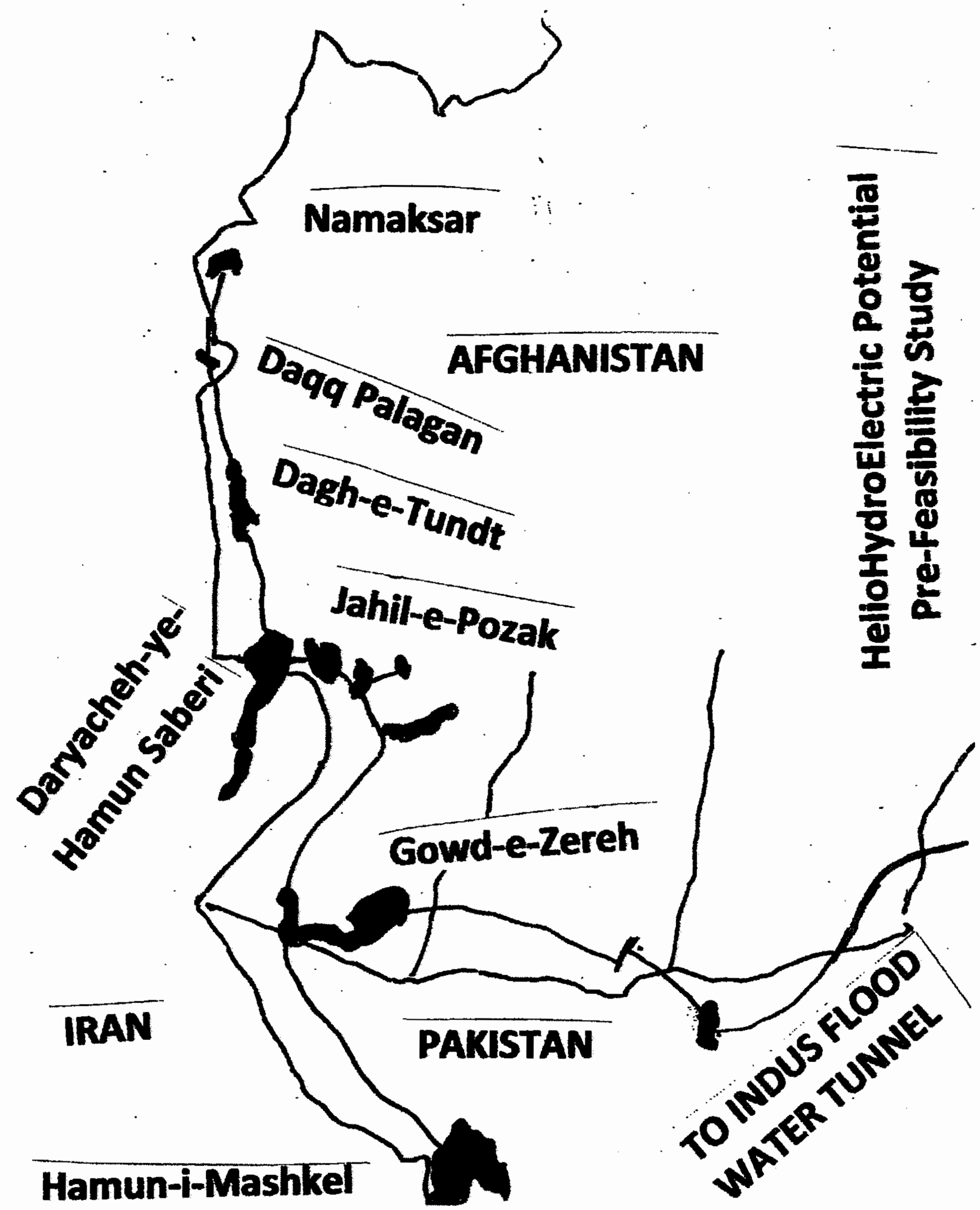
ABSTRACT: HelioHydroElectric is a little known solar engineering technology, using salt/sea water and solar power to create evaporation ponds for artificial rain in deserts. Pakistan and Afghanistan have large resources. Located in the Western part of Pakistan and Afghanistan are dry salt lakes. These can be flooded with salt/sea water to create clouds from evaporation. The additional rainfall would increase vegetation, thus removing carbon dioxide from the atmosphere. HelioHydroElectric technology is the only technology that can actually remove carbon dioxide from the atmosphere. The additional rainfall in Western Pakistan and Afghanistan will increase agriculture and provide new living space. Not only can salt/sea water be used, but also flood water from the Indus River can be used to flood these dry salt lakes. Development of HelioHydroElectric has the potential of also solving the energy crisis in Pakistan, by spurring development of solar technology, energy self-production, and conservation. This will help solve the conflict in Kashmir, via better watershed management. It is hoped this paper will spur conversations and funding for a full feasibility study.




5)Gowd-e-Zereh
AGHANISTAN
Pishin
Dasht-e-Arbu-Lut
TUNNEL TO INDUS
FLOOD WATER
Pishin Lura
6)Hamun-i-Lora
4)Hamin-i-Mashkel
IRAN
BALOCHISTAN
PAKISTAN
HelioHydroElectric Potential
Pre-Feasibility Study
3)Mayran Salt Swamp
2)Hoshab
1)Kolwa
Industrial Center
Rann of Kutch
ARABIAN SEA
INDIA
M.Nix
Seattle, WA
June 2015

Extension into Afghanistan

HelioHydroElectric Potential
Pre-Feasibility Study



M.Nix
Seattle, WA
June 2015

INTRODUCTION: Proposed is the pumping of salt/seawater inland to Pakistan and Afghanistan for flooding of existing dry salt lakes to create clouds, and thus artificial rain. This technology, known as HelioHydroElectric technology, will create more vegetation in the desert, region and in mountains, thus reversing Global Warming. It will stimulate the economy of Pakistan and Afghanistan.
Solar pumping technology is now very well developed. This Prefeasibility study is mostly to study the potential for construction of such a project. It is hoped that funding for a complete Feasibility study can be located so as to determine the environmental impact, climate impact, and economic impact along with construction plans and cost. Israel, Jordan and Palestine are presently constructing the Red to Dead Sea project, so as to add additional moisture to the region. Egypt has under study the Qattara Depression project. This is being reviewed elsewhere.

METHODOLOGY: Calculations were conducted to get a general idea of the power consumption required for pumping this large volume of salt/seawater inland to Pakistan and Afghanistan. It should be noted that locating geologic information for these sites is difficult. The author is unfamiliar with the region, and apologizes for any misspellings of locations. Sites were identified. Surface area of these dry lakes was estimated, along with elevation. The evaporation rate is unknown for these locations; however, it was assumed that 1% of the surface area would evaporate per day. Evaporation rate data is unknown; however, it was assumed that each square foot of surface of flooded water had 2,000 btus per day of solar energy. Water boils at 212 degrees. The heat of evaporation is 972 btus/lb. Numerous factors are involved with evaporation rate, including reflection from sunlight, altitude, cloud cover, temperature, and so on. Despite the lack of geologic data, still a lot can be determined, and hopefully it will spur further research. (source of data: Wikipedia)

Kolwa

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
500 square miles	1,000 feet	13,939,200,000 sq. feet	139,392,000 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb.
5,808,000 cu.ft./hr.	96,800 cu.ft/min.	1,613 cu.ft./sec.	62.42769 lb./cu.ft

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
8,701,958,200,000	362,581,591,700	6,043,026,528	100,717,108
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
136,554,064 WATTS	136,554,063 WATTS	136,554,063 WATTS	136,554,062 WATTS

HOSBAB

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
100 square miles	1,000 ft.	3,387,240,000 sq.ft.	33,872,400 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft.
1,411,350 cu.ft./hr.	23,522 cu.ft./min.	392 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
211,458,483,200	88,107,701,350	1,468,461,689	24,474,361
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
33,182,778 WATTS	33,182,778 WATTS	33,182,778 WATTS	33,182,778 WATTS

MAYRAN

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
500 sq.miles	1,500 feet	16,936,200,000 sq.ft.	169,362,000 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft
705,650 cu.ft./hr.	117,612 cu.ft./min.	1,960 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
15,859,386,240,000	66,080,776,000	11,013,462,670	18,355,771
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
248,870,839 WATTS	248,870,839 WATTS	248,870,839 WATTS	248,870,839 WATTS

Human-E-Mashkel

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
3,045 sq.miles	1,635 feet	84,889,728,000 sq.ft.	848,897,280 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb.
35,370,720 cu.ft./hr.	589,512 cu.ft./min.	9,825 cu.ft./sec.	62.42769 lb./cu.ft.

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
86,646,703,090,000	3,610,279,296,000	60,171,321,590	1,002,855,360
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
1,359,689,299 WATTS	1,359,689,298 WATTS	1,359,689,296 WATTS	1,359,689,298 WATTS

Gowd-E-Zereh

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
3,000 sq.miles	1,532 ft.	83,635,200,000 sq.ft.	836,352,000 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb.
34,848,000 cu.ft./hr.	580,800 cu.ft./min.	9,680 cu.ft./sec.	62.42769 lb./cu.ft

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
79,988,399,780,000	333,284,999,100	55,547,499,850	925,791,664
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
1,255,204,957 WATTS	1,255,204,955 WATTS	1,255,201,954 WATTS	1,255,204,956 WATTS

NAMAKSAR

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
300 sq.miles	2,000 ft.	8,363,520,000 sq.ft.	83,635,200 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft.
3,484,800 cu.ft./hr.	58,080 cu.ft./min.	968 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
10,443,349,840,000	435,097,910,000	7,251,031,834	120,860,530
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
163,864,876 WATTS	163,864,876 WATTS	163,864,876 WATTS	163,864,876 WATTS

Daqq Palagan

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
100 sq.miles	2,000 ft.	2,787,840,000 sq.ft.	17,878,400 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft
1,161,600 cu.ft./hr.	19,360 cu.ft./min.	322 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
348,078,328,000	1,450,326,367	2,417,210,611	40,286,843
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
54,621,625 WATTS	54,621,625 WATTS	54,621,625 WATTS	54,621,625 WATTS

Jahil-E-Pozak

Surface Area (Miles)	Elevation (Feet)	Square Feet Area	Estimate Evaporation Rate/Day
		Surface Area x 5280 X 5280	(1% per day)
2,000 sq.miles	2,000 ft.	55,756,800,000 sq.ft.	55,768,000 cu.ft./day

Evaporation Rate/Hour	Evaporation Rate/Minute	Evaporation Rate/Second	Weight Water/lb.
(Divide by 24)	(Divide by 60)	(Divide by 60)	62.42769 lb./cu.ft.
2,323,666 cu.ft./hr.	38,727 cu.ft./min.	645 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
6,962,964,947	2,901,234,562	4,835,295,214	80,589,872
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
109,265,195 WATTS	109,265,163 WATTS	109,263,000 WATTS	109,265,195 WATTS

Daryacheh-Ye-Hamun

Surface Area (Miles)	Elevation (Feet)	Square Feet Area	Estimate Evaporation Rate/Day
		Surface Area x 5280 X 5280	(1% per day)
2,000 sq.miles	2,000 ft.	55,756,800,000 sq.ft.	557,568,000 cu.ft./day

Evaporation Rate/Hour	Evaporation Rate/Minute	Evaporation Rate/Second	Weight Water/lb.
(Divide by 24)	(Divide by 60)	(Divide by 60)	62.42769 lb./cu.ft
23,232,000 cu.ft./day	387,200 cu.ft./min.	6453 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
69,615,865,600	29,000,652,733	4,834,421,222	805,695,251
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
1,092,432,513 WATTS	1,092,432,505 WATTS	1,092,432,510 WATTS	1,092,376,085 WATTS

Dagh-E-Tundt

Surface Area (Miles)	Elevation (Feet)	Square Feet Area Surface Area x 5280 X 5280	Estimate Evaporation Rate/Day (1% per day)
1,000 sq.miles	2,000 ft.	27,878,400,000 sq.ft.	278,787,400 cu.ft./day

Evaporation Rate/Hour (Divide by 24)	Evaporation Rate/Minute (Divide by 60)	Evaporation Rate/Second (Divide by 60)	Weight Water/lb. 62.42769 lb./cu.ft.
11,616,000 cu.ft./hr.	143,600 cu.ft./min.	3,226 cu.ft./sec.	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	Foot Pounds per Hour	Foot Pounds per Minute	Foot Pounds per Second
34,807,832,800,000	1,4503,763,670	24,172,168,118	40,278,197
X 0.00001569623374	X .000376616097	X .0225969658	X 1.35581795
546,216,256 WATTS	546,216,252 WATTS	546,216,300 WATTS	546,103,401 WATTS

SUMMARY OF RESULTS

	POWER	FLOW RATE	EVAPORATION RATE
Kolwa	136,554,064 Watts	161 cu.ft./sec.	139,392,000 cu.ft./day
Hoshab	33,182,278 Watts	39 cu.ft./sec.	33,872,400 cu.ft./day
Mayran Salt Swamp	248,870,839 Watts	196 cu.ft./sec.	169,362,000 cu.ft./day
Hamun-E-Mashkel	1,359,689,299 Watts	982 cu.ft./sec.	848,897,280 cu.ft./day
Namaksar	163,864,761 Watts	96 cu.ft./sec.	83,635,200 cu.ft./day
Daqq-Palagan	54,621,625 Watts	32 cu.ft./sec.	27,878,400 cu.ft./day
Gowd-E-Zereh	1,255,204,955 Watts	968 cu.ft./sec.	836,352,000 cu.ft./day
Hamun-I-Lora	204,831,096 Watts	161 cu.ft./sec.	139,392,000 cu.ft./day
Jahil-E-Pozak	109,263,000 Watts	64 cu.ft./sec.	55,768,000 cu.ft./day
Daryacheh-Ye-Hamun	1,092,432,505 Watts	645 cu.ft./sec.	557,568,000 cu.ft./day
Daqq-E-Tundt	546,216,256 Watts	322 cu.ft./sec.	278,784,000 cu.ft./day
TOTAL:	5,204,730,678 WATTS *	3,666 cu.ft. /sec.	3,170,901,280 cu.ft./day

.* Total does not include inefficiencies, such as transmission loses, water turbine efficiencies, electric motor heat loss, friction in pipes or canals, and so on.

Amount of rain fall generated per day (at 1% evaporate rate per square mile) :
3,170,901,280 cu.ft./day
1,128,840,856,000 cu.ft./year
7.6 cubic miles of rainfall/year
Covering 38,016 square miles with 1 foot of rainfall per year.
5,204 Mega Watts of power necessary for pumping salt/seawater at 100% efficiency.
Equivalent to approximately 5 large power plants.

WATER PIPE DIAMETER OR CANAL SIZE: Assuming the flow rate of the water in the pipe and/or canal is 1 ft. per second, the canal size would be about 67 feet X 67 feet. If a pipe is used, the pipe diameter would be about 66 feet in diameter. It is undetermined the amount of concrete required for building, however, this can be calculated. Construction cost, labor and schedules can also be determined as part of the Feasibility study. It should be noted that canals can silt up in a dust storm. Pipes can handle pressure better and have faster flow rates. It is recommended, that consideration be given to locating canal/pipes along borders of nations. Good borders make for good neighbors.

Rann of Kutch HelioHydroElectric Area: There is one very large area in Southeaster Pakistan and Western India that is a huge dried up salt lake. This use to be a sea, but due to geologic uplifting, is now dry. The area has a huge potential for evaporation of artificial rainwater. It borders Pakistan and India, and is not that far above sea level. By using solar powered pumps, wave energy, and combined with wind energy, a large volume of seawater can be pumped to flood, again, this region. One interesting design is the use of "troughs" that gradually become narrow, thus allowing energy from ocean waves to be used for pumping seawater uphill. (It would be a sight.) This would add a large volume of fresh rain water to India from the evaporation. It will require cooperation between Pakistan and India.

Rann of Kutch

Surface Area (Miles)	**Elevation (Feet)**	**Square Feet Area Surface Area x 5280 X 5280**	**Estimate Evaporation Rate/Day (1% per day)**
10,000 sq.miles	**45 ft.**	**278,784,000,000 sq.ft.**	**2,787,840,000 cu.ft./day**

Evaporation Rate/Hour (Divide by 24)	**Evaporation Rate/Minute (Divide by 60)**	**Evaporation Rate/Second (Divide by 60)**	**Weight Water/lb. 62.42769 lb./cu.ft**
116,160,000 cu.ft./hr.	**1,936,000 cu.ft./min.**	**32,266 cu.ft./sec.**	

(Evaporation Rate X 62.42769 X Elevation)

Foot Pounds per Day	**Foot Pounds per Hour**	**Foot Pounds per Minute**	**Foot Pounds per Second**
7,831,762,380,000	**3,263,234,325**	**5,438,723,875**	**90,645,397**
X 0.00001569623374	**X .000376616097**	**X .0225969658**	**X 1.35581795**
122,898,657 WATTS	**122,898,657 WATTS**	**122,898,657 WATTS**	**122,898,657 WATTS***

.* Power requirements do not include inefficiencies such as transmission loses, water turbine efficiencies, electric motor heat loss, friction in pipes or canals, and so on.

Amount of rain fall generated per day (at 1% evaporate rate per square mile) :
2,787,840,000 cu.ft./day
992,471,040,000 cu.ft./year
6.7 cubic miles of rainfall/year
Covering 35,600 square miles with 1 foot of rainfall per year.
122 Mega Watts of power necessary for pumping salt/seawater at 100% efficiency.
Equivalent to approximately about 1/10 of a large power plant.

INDUS RIVER FLOOD DIVERSION TUNNEL: One option for providing rain water to the region is to build a diversion tunnel for flood waters from the Indus River. This Indus River Diversion Tunnel would allow fresh water to flow to both Pakistan and Afghanistan, while providing evaporation. The additional evaporation would provide rain water during the dry season in nearby mountains. As a general rule, rain will travel from west to east. There is an additional benefit in using flood waters. It will flush salt brine to the ocean. If not flushed, these dry lakes, flooded for evaporation, will eventually silt up, or better said salt up. The goal is to have these evaporation lakes work centuries in the future, generation to generation. The Indus River Diversion Tunnel could generate electrical power during flood seasons.

FLUSHING SALT BRINE: It is proposed that an underground tunnel pipe be built, using either cut-and-cover technology, or deep bore tunneling. The construction of these Salt Brine Tunnels will flush salt from the evaporation lakes, thus extending their useful lives. The ocean is approximately 3% salt. Concentrated salt brine (i.e. 27%) can then be piped back to the ocean. This would be supplemented by flushing with Indus River Flood waters. There are ways of separating concentrated salt brine from fresh water. These Salt Brine Tunnels would parallel the planned canal/pipes, and would be smaller diameter, since their major purpose is transportation of concentrated salt.

MICROCLIMATE EFFECT: It should be noted that once these salt dry lakes are flooded with salt water, the evaporation from rain water builds up in the surrounding mountains and plains. Fresh rain water is locked up in plants, fresh water lakes, and underground aquifers. Plants and trees also add moisture to the air. Each year, the evaporation is cumulative. The first year, for example, one cubic mile of fresh rain water is added to the environment, the next year another cubic mile, the year following another cubic mile. Gradually moisture builds up in the local environment. Presently Afghanistan is required to provide 910 cu.ft./sec. of water to Iran on the Helman River.

IMPACT ON KASHMIR: The evaporation from these HelioHydroElectric projects will not only restore vegetation in local mountains, but also provide more rain water to the Kashmir region. The development of HelioHydroElectric will solve the conflict between India, Pakistan and China. Water in Kashmir flow to Pakistan, India or China. By dividing the region according to watershed, it will solve land claims. Watershed management is very important to provide flood management and to manage water during dry seasons. Pakistan should manage its own watershed, while China and India should manager theirs.

IMPACT BY IRAN: It should be noted that Iran is also considering HelioHydroElectric development. Proposed is a ship canal going from the Arabian Sea to the Caspian Sea, via Tehran. Outside of Tehran is a huge land area, the Dasht-e-Kavir, which can be flooded with seawater. By adding additional seawater for evaporation, this will provide more rain water for Pakistan, Afghanistan and India. A separate Prefeasibility study is being prepared for Iran.

IMPACT ON GLOBAL WARMING: The additional rainfall in the desert should increase the amount of vegetation. The vegetation will remove carbon dioxide from the atmosphere. With the upcoming treaty conference in Paris, in December, a HelioHydroElectric Treaty can be developed between India, Pakistan, Iran and Afghanistan. The Treaty would offset carbon dioxide emission.

POWER REQUIREMENTS: The power requirements to pump this large volume of seawater inland are huge. However, this is not impossible. Based on these calculations, close to1/4 to 1/3 of the entire electrical power produce by Pakistan would be needed. Pakistan generates on average 22,000 Megawatts of electrical. While it is beyond the scope of this Prefeasibility study, it is believed by the author that with rapid development of solar energy, and energy conservation was implemented, it would make this electrical power available for salt water pumping. It could supplement and solve the energy crisis in Pakistan. There have been electricity shortages. There are numerous technologies that can be implemented, including Photovoltaic panels on residential and commercial buildings. (These make the meter run backwards.) The list is nearly endless in solar technologies that can be implemented to achieve electricity conservation: solar hot water, solar cooking, solar salt water distillation, solar lighting, micro wind turbines, paddle wheel systems on canals, solar greenhouses, rain barrels, solar smelters, solar water pumping, solar powered air conditioning, night sky radiation refrigeration, biomass conversion, biofuels, energy efficient appliances and so on. This technology would employ people in Pakistan, and would be a new export industry. A lot of the problem of electrical supply is lack of capacity in the distribution and transmission lines. With better load management, energy self-production, and conservation, it would make electricity available for the HelioHydroElectric projects. The goal would be to have people "make their own energy". Good models to follow are the efforts of Denmark, Netherlands, and Germany.

BIOFUEL PRODUCTION: These flooded salt lakes also have another gift: algae. Algae can be converted to biofuels. Thus creating a new energy source. The airlines, i.e. Pakistan Air, are exceptionally interested in BioJet fuels made from algae.

NATURAL GAS OPTION FOR SEAWATER PUMPING: Natural gas is often used for irrigation pumping. There are sufficient natural gas supplies in the region. Often times it is a waste product from oil production, where natural gas is flared. Natural gas can be used for pumping seawater for the HelioHydroElectric project. The goal is to make this project sustainable from generation to generation in the future. If natural gas is utilized, plans should be implemented for eventual conversion to solar and wind energy. This can be done. For example, solar energy can break down water to hydrogen. It is feasible to convert coal power plants, natural power plants (and even nuclear power plants) to be powered by solar energy. The technology exists. It is unknown if the amount of carbon dioxide generated by natural gas combustion would be offset by the additional vegetation grown, but this can be determined. It will be necessary to use natural gas for construction materials for the project. Concrete for pipes and canals would be need natural gas to power the factories. It should be noted that the heat of exhaust (as from a natural gas generator) or steam from a cooling tower, can evaporate salt water so that it adds additional rainfall to the region.

BETTER LOAD MANAGEMENT OF EXISTING ELECTRICAL SYSTEM: It will be impossible to achieve electrical stability with traditional "flat rates", where everyone pays the same. All electrical power does not cost the same to generate. Nuclear power being the most expensive, while hydro power is often the lowest. Often times the various energy sources for generation for electrical power is averaged, mixing the cost together. By going to a "the more you use, the more you pay" rate structure, it will encourage "mega wasters" to conserve. For example, the first 500 Kilowatts would be 3 cents per Kilowatt, the second 500 Kilowatts would be 6 cents, the next 500 Kilowatts 9 cents, and so on. A low income grandmother, for example, who only uses a small amount for a light and a refrigerator, would only pay a few dollars a month. However, someone with a large mansion, who consumes nearly 100,000 Kilowatts, would pay on upwards to $1000 a month. It would give the mansion owner an incentive to install solar panels, or implement conservation measures. It would employ people installing the equipment. Another option for business would be Time of Day Metering, where in day, when there are shortages of electrical power, a business would pay say, 50 cents per Kilowatt. But at night when electrical is very available, the business could pay only 5 cents per Kilowatt. This gives business a financial incentive to implement conservation and energy self production. It is beyond the scope of this Prefeasibility study to discuss load management, but this could be a method to make electricity available for the large amount of electricity required for pumping for the HelioHydroElectric project.

MILITARY INVOLVEMENT: Pakistan spends considerable funds on the military. The military should review spending so as to implement dual-use. Dual-use means technology that can be used to stimulate the economy while providing for national defense. For example, a national Bicycle Trail System, where bicycles are separate from car traffic, would conserve fossil fuels. It would provide a low cost, none carbon, form of transportation. It would stimulate the economy. The military can use its corps of engineers to build these projects. The military can assist with manpower on constructing the HelioHydroElectric project. The Medical Corps for example could build and distribute solar cookers and solar salt water distillers to low/no income people. Thus improving the health of children nationwide. The military for example, can assist in better watershed management, such as reforestation. There needs to be recognition that Global Warming is a mutual threat to both India and Pakistan. Cooperation for watershed management in the Kashmir region, for example, can be implemented by both militaries of India and Pakistan. What we need is a Declaration of War on Global Warming, not "nation vs. nation". This can be done. It is beyond the scope of this Prefeasibility study to discuss the involvement of the Pakistan military, but the military does have valuable resources that can be applied.

CONCLUSION: The nation of Pakistan is strongly encouraged to explore a fossil-fuel-less and a none-nuclear energy future. Instead Pakistan should explore what other nations have done with development of solar energy and wind energy. HelioHydroElectric development could be that catalyst for such a future. It would create a more equable society where people make their own energy, and a cleaner future. This over emphasis on fossil fuels is adding carbon dioxide to the atmosphere, which is threatening the future of Pakistan from Global Warming. Nuclear power plants have a known problem of being dangerous. The explosion of one nuclear power plant would spread radiation, affecting the health of nearly 1.8 billion people. While Nuclear power plants last only 50 years, the proposed HelioHydroElectric project will last for generations. Nuclear power plants are more of a threat to Pakistan than even India. Heavy dependence on dangerous and polluting energy sources will create a society that is violent. However, going to a renewable energy society will make for a healthy economy, plus, and a more free society.

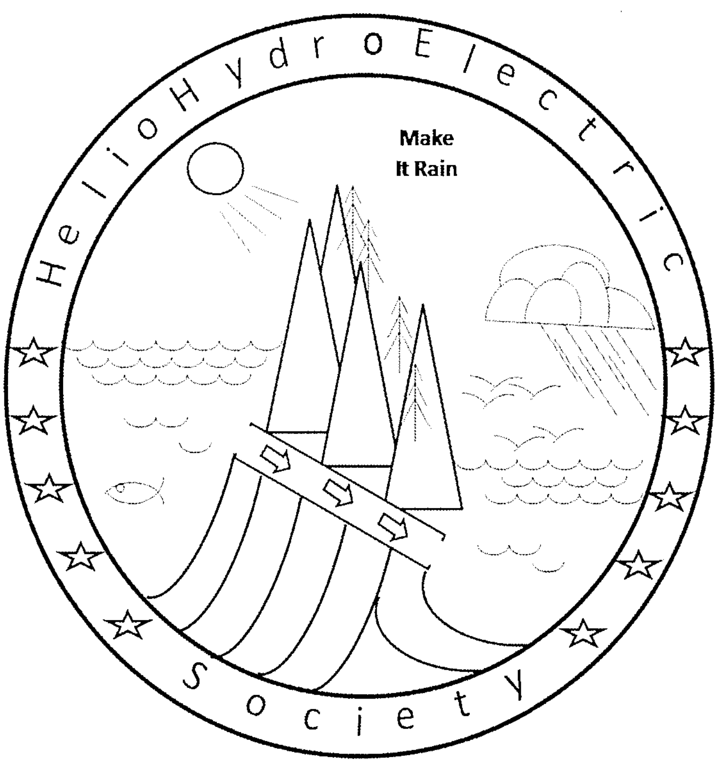
ABOUT THE AUTHOR: Martin Nix is the founding secretary of Solar Washington, a group dedicated to promotion of solar technology in the State of Washington, USA. He has 9 U.S. patents in solar technology. He is a graduate of the University of New Mexico, and North Seattle Community College. He attended the School of Regional Planning and Architecture at UNM, and also the School of Engineering at NMSU. B.U.S., A.A.S.

WEB SITE: www.heliohydroelectric.org

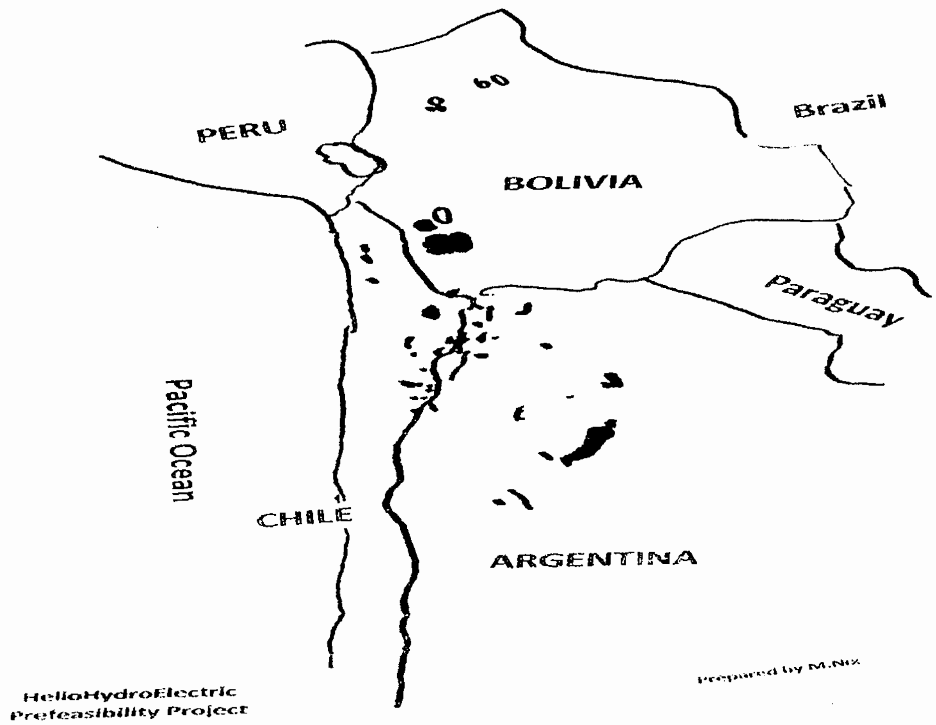
HelioHydroElectric Potential
Prefeasibility Study
SOUTH AMERICA

Prepared by Martin Nix B.U.S, A.A.S Seattle, WA, June, 2015

ABSTRACT: HelioHydroElectric is a little known solar engineering technology, using salt/sea water and solar power to create evaporation ponds for artificial rain in deserts. The South America has large HelioHydroElectric resources. Located in the South America Continent are dry endorheic salt lakes. These can be flooded with salt/sea water to create clouds from evaporation. The additional rainfall would increase vegetation, thus removing carbon dioxide from the atmosphere. HelioHydroElectric technology is the only technology that can actually remove carbon dioxide from the atmosphere. The additional rainfall in South America will increase agriculture and provide new living space. Not only can salt/sea water be used, but also underground alkali aquifer water can be used to flood these dry salt lakes. It is proposed that wind and solar power be used, along with energy conservation, for water pumping. Development of HelioHydroElectric has the potential of solving the drought problem in South America. It is also proposed that the ancient Mayan Canal system of Central America be rebuilt. Various sites were graphed for potential future study. It is hoped this paper will spur conversations and funding for a full feasibility study.



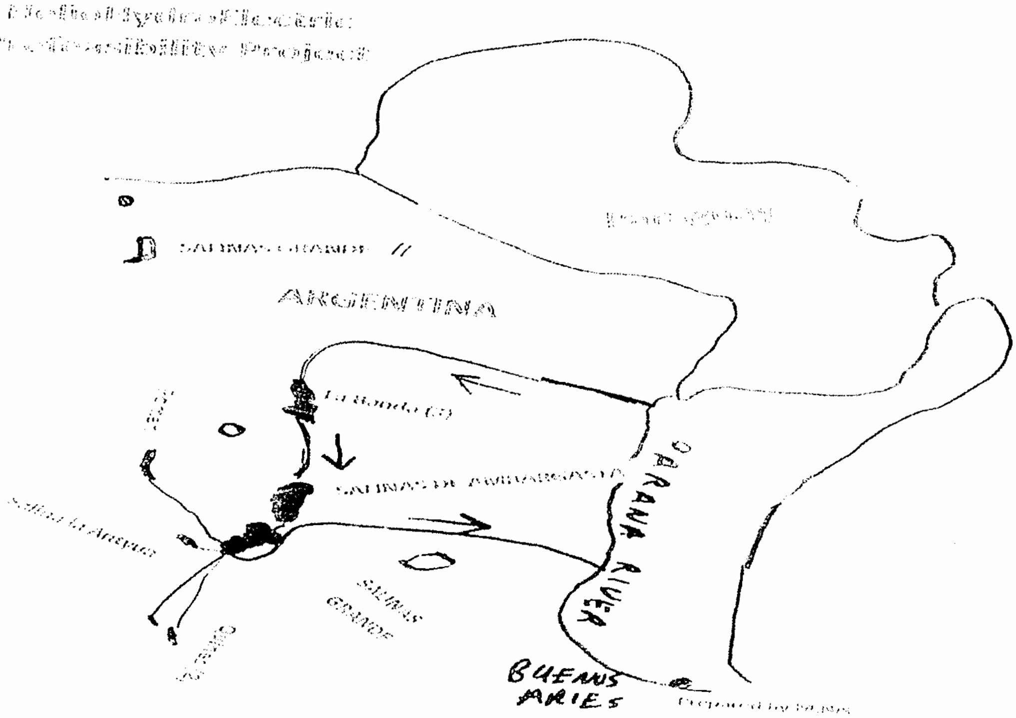
INTRODUCTION: Proposed is the pumping of salt/seawater inland into the South American Continent for flooding of existing dry salt lakes to create clouds, and thus artificial rain. This technology, known as HelioHydroElectric technology, will create more vegetation in the desert, region and in mountains, thus reversing Global Warming. It will stimulate the economy of South America. Solar pumping technology is now very well developed. This Prefeasibility study is mostly to study the potential for construction of such a project. It is hoped that funding for a complete Feasibility study can be located so as to determine the environmental impact, climate impact, and economic impact along with construction plans and cost. Israel, Jordan and Palestine are presently constructing the Red to Dead Sea project, so as to add additional moisture to the region. Egypt has under study the Qattara Depression project. This is being reviewed elsewhere. Iran and Pakistan are considering HelioHydroElectric projects. Flood waters can be integrated, thus storing water for drought. The evaporation will help stabilize the climate.



CHILE/BOLIVIA

LOCATION	AREA (Sq.Miles)	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Atacama Salt Flats	1,200	334,540,800(cu/ft/day)	3,872 (cu/ft/s)	2,472 (MW)
Altiplano	1,000	278,784,000	3,226	4,096
Misc.Sites	1,000	278,784,000	3,336	2,731
Total:	3,200	892,108,800	10,434	9,299

Note: Flood waters can be used to flood dry salt lakes from nearby rivers.



ARGENTINA

LOCATION	AREA (Sq.Miles)	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
Salina Grande	81	228,184 (cu/ft/day)	2 (cu/ft/s)	2 (MW)
Solar De Uyuni	4,086	1,139,111,424	13,184	4,079
Salina De Arizaro	4,478	2,399,754,750	14,449	13,833
Misc.Sites	1,000	278,784,000	3,226	2,731
TOTAL:	9,645	3,817,878,358	44,184	20,642 Megawatts

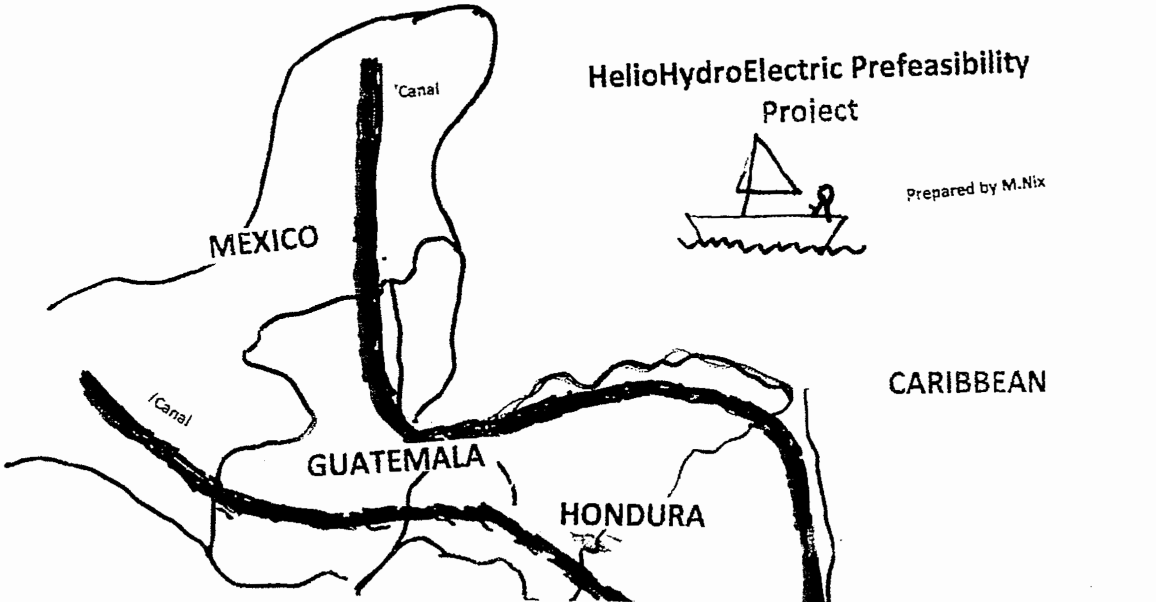
SUMMARY

SOUTH AMERICA TOTAL

LOCATION	AREA (Sq.Miles)	Evaporation Rate/Day	Evaporation Rate/Second	Power (Megawatts)
CHILE/BOLIVIA	3,200	892,108,800(cu/ft/day)	10,434 (cu/ft/s)	9,299 (MW)
ARGENTINA	9,645	3,817,878,358	44,184	20,642
Grand Total	12,845	4,709,987,158	54,618**	29,941*

*Power requirements assume 100% conversion efficiency. Does not include friction, power loses, motor efficiency, and so on.

** Assumes 1% evaporation rate, per surface area.



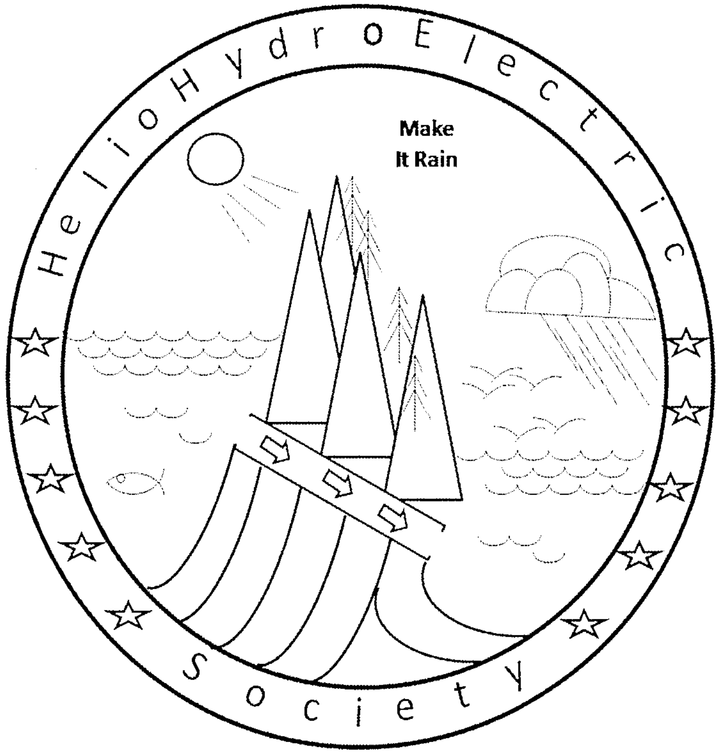
REBUILD THE ANCIENT MAYAN CANAL SYSTEM

Centuries ago when the Spanish invaded, the Spanish destroyed an elaborate water canal system that stretched from Mexico to Peru. It handled tonnage, and literally built the pyramids. The Spanish destroyed the canal system, in part to put the local people into slavery, and to destroy the economy. The region has never recovered economically. Rebuilding the ancient canal system would put in a low cost form of transportation, so the region is less dependant on roads, or gasoline. Boats can handle heavy cargo, thus it would create a common market in all of Central America. It would do a lot at eliminating poverty and increasing trade and employment. The canal system is still there. REBUILD IT.

HelioHydroElectric Potential
Prefeasibility Study
California,Nevada,Utah,Arizona,New Mexico,Northern Mexico

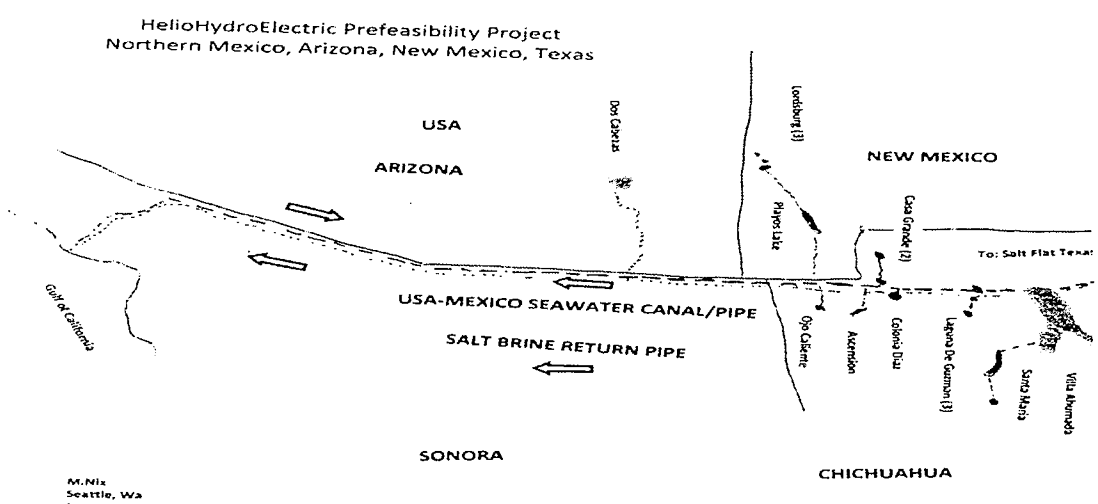
Prepared by Martin Nix B.U.S, A.A.S Seattle, WA, June, 2015

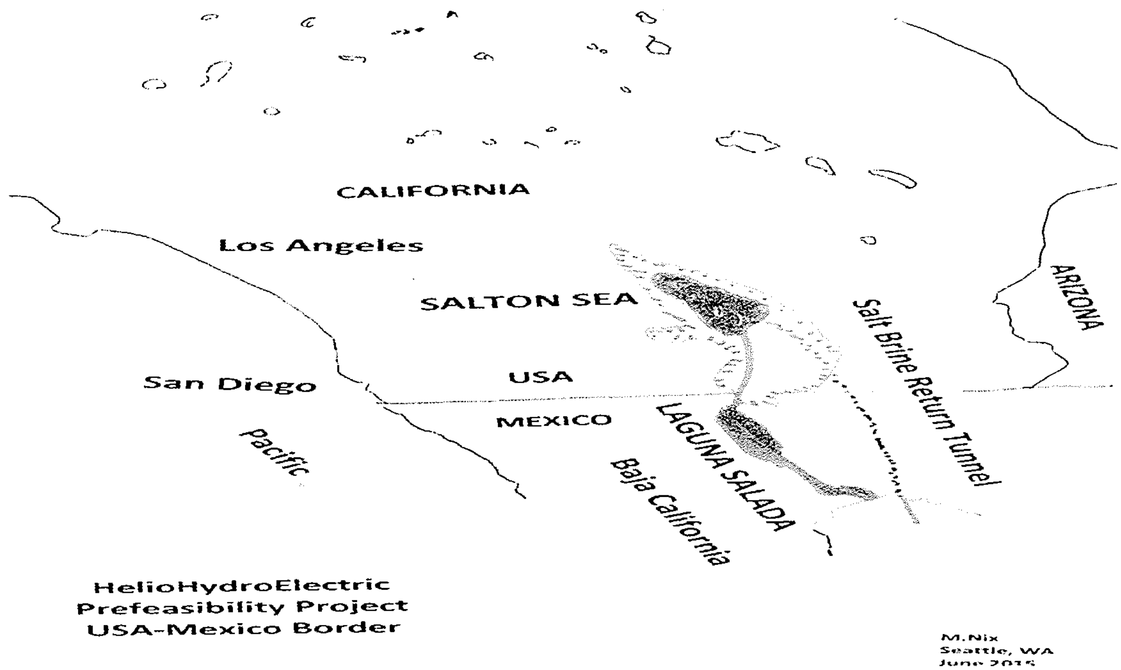
ABSTRACT: HelioHydroElectric is a little known solar engineering technology, using salt/sea water and solar power to create evaporation ponds for artificial rain in deserts. The Western United States and Northern Mexico have large HelioHydroElectric resources. Located in the Western North American Continent are dry endorheic salt lakes. These can be flooded with salt/sea water to create clouds from evaporation. The additional rainfall would increase vegetation, thus removing carbon dioxide from the atmosphere. HelioHydroElectric technology is the only technology that can actually remove carbon dioxide from the atmosphere. The additional rainfall in Western USA and Mexico will increase agriculture and provide new living space. Not only can salt/sea water be used, but also underground alkali aquifier water can be used to flood these dry salt lakes. It is proposed that wind and solar power be used, along with energy conservation, for water pumping. Development of HelioHydroElectric has the potential of solving the drought problem in California. 171 sites were evaluated for potential, and it is concluded that it will require approximately 10,000 megawatts to flood these proposed sites, creating approximately 1 billion cubic feet each day of additional rainwater in this desert region. It is hoped this paper will spur conversations and funding for a full feasibility study.



INTRODUCTION: Proposed is the pumping of salt/seawater inland to the Western United States and Northern Mexico for flooding of existing dry salt lakes to create clouds, and thus artificial rain. This technology, known as HelioHydroElectric technology, will create more vegetation in the desert, region and in mountains, thus reversing Global Warming. It will stimulate the economy of the Western United States and Northern Mexico. Solar pumping technology is now very well developed. This Prefeasibility study is mostly to study the potential for construction of such a project. It is hoped that funding for a complete Feasibility study can be located so as to determine the environmental impact, climate impact, and economic impact along with construction plans and cost. Israel, Jordan and Palestine are presently constructing the Red to Dead Sea project, so as to add additional moisture to the region. Egypt has under study the Qattara Depression project. This is being reviewed elsewhere. Iran and Pakistan are considering HelioHydroElectric projects, with HelioHydroElectric Society assistance.

METHODOLOGY: Calculations were conducted to get a general idea of the power consumption required for pumping this large volume of salt/seawater inland. It should be noted that locating geologic information for these sites is difficult. The author found it difficult in some cases to get accurate geologic data, so apologizes for any misspellings of locations. Sites were identified. Surface area of these dry lakes was estimated, along with elevation. The evaporation rate is unknown for these locations; however, it was assumed that 1% of the surface area would evaporate per day. While evaporation rate data is unknown, it was assumed that each square foot of surface of flooded water had 2,000 btus per day of solar energy. Water boils at 212 degrees. The heat of evaporation is 972 btus/lb. Numerous factors are involved with evaporation rate, including reflection from sunlight, altitude, cloud cover, temperature, salinity, and so on. The author would use names and data of nearby geologic features to indicate the location of the evaluated site in information as absent. Calculations were based on surface area and elevation, to obtain foot pounds and then the power consumption for water pumping was calculated. Variations of data are subject to rounding calculator error. Despite the lack of geologic data, still a lot can be determined, and hopefully it will spur further research. (Source of data: Wikipedia)

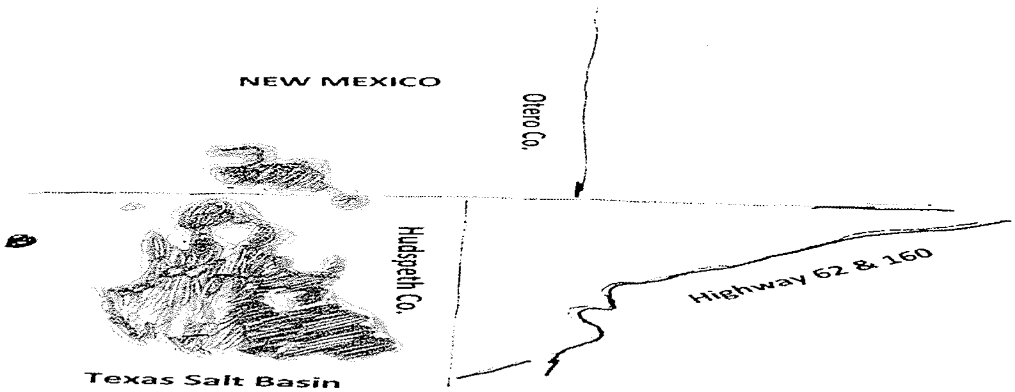


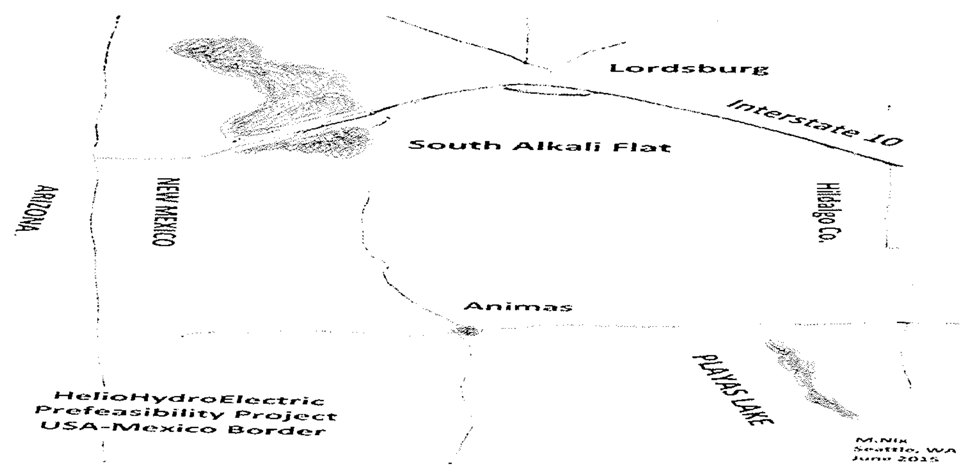


Name of Site	Northern Mexico Evaporation Rate per Day	Evaporation Rate per Second	Power Requirements for Pumping
Santa Maria	5,575,680	64.00	21.00
Laguna De Patos	27,878,400	322.00	105.00
Ojo Caliente	2,787,840	32.00	12.50
Colonia Diaz	278,784	3.20	1.09
Laguna De Guzman	2,787,840	32.20	10.79
Villa Ahumada	836,352	9.68	3.27
Casa Grande	836,352	9.68	3.27
Salton Sea	95,622,912	1106.00	-21.1
El Centro-U.S.Navy	27,878,400	322.00	-2.7
Laguna Salada	83,635,200	968.00	-2.5
Totals	43,769,088 cubic feet/day	504.76 cubic feet/sec	168.52 Megawatts*

*Power requirements do not include inefficiencies, such as transmission loses, pump loses, or friction in water pipes or other conversion loses. Assumes 100% efficiency.

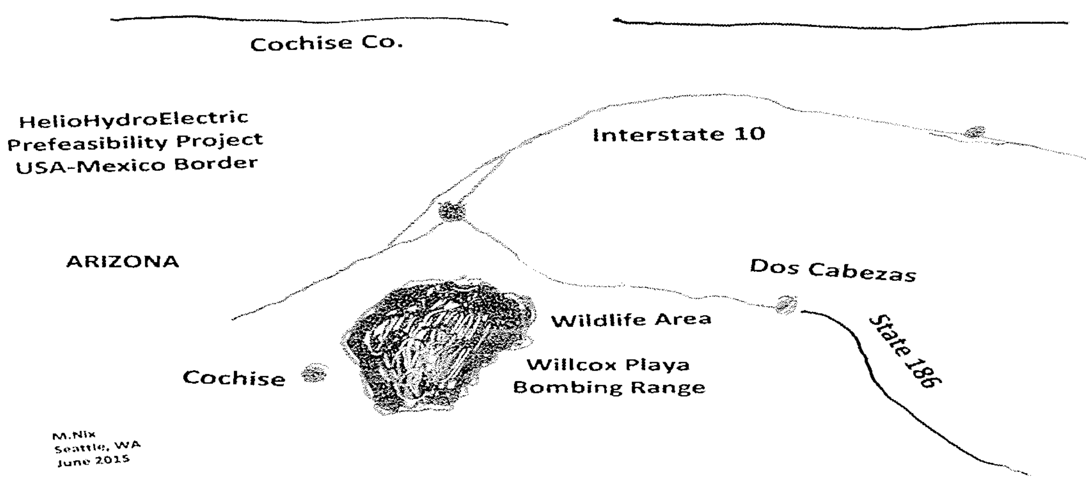
Note: Northern Mexico, especially in Chihuahua, has extensive dry lakes. Of concern is the Samalayauca Dune Fields. This region has unique species that has adopted to the drought. There are numerous ranches in the area, which could use the additional rain water for cattle. The New Mexico Geological Society has done extensive analysis of the geology of the region. The Salton Sea, El Centro, and Laguna De Salada are below sea level.





	New Mexico (Texas)		
Name of Site	**Evaporation Rate per Day**	**Evaporation Rate per Second**	**Power Requirements for Pumping**
San Agustin	**2,787,840**	**32.20**	**19.40**
Lordsburg	**8,363,520**	**96.80**	**34.40**
White Sands Dry Lake	**1,115,136**	**12.90**	**4.60**
Playas Lake	**2,787,840**	**32.20**	**11.6**
Luna Co.	**2,787,840**	**32.20**	**11.8**
West Texas Salt Basin	**16,727,040**	**193.60**	**6.8**
Totals	**34,569,216 cubic feet/day**	**399.90 cubic feet/sec**	**88.6 Megawatts***

*Power requirements do not include inefficiencies, such as transmission loses, pump loses, or friction in water pipes or other conversion loses. Assumes 100% efficiency.



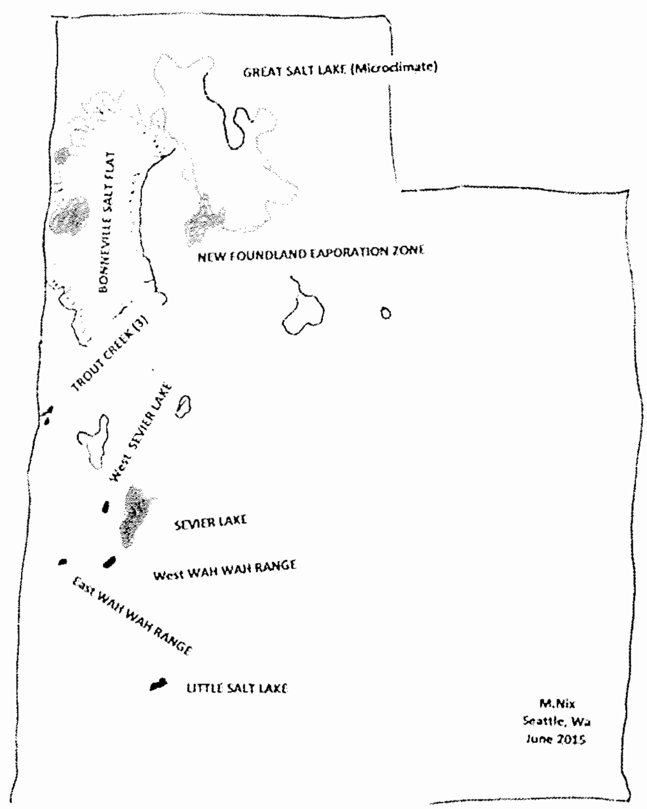
Name of Site	Evaporation Rate per Day	Arizona Evaporation Rate per Second	Power Requirements for Pumping
Little Captain	278,784	32.20	1.50
Red Lake	6,969,600	80.60	23.2
Beautiful Valley	278,784	3.2	1.38
Oatman	1,393,920	16.13	2.48
Holbrook	2,420,352	28.01	12.04
Navaho Spring Dry Lake	278,284	3.20	1.30
Big Maria	2,187,840	25.32	1.57
Barry Goldwater AFB	27,878,400	322.6	6.71
Wilcox 27,878,400	6,969,600	80.6	29.33
Totals	48,655,564 cubic feet/day	591.86 cubic feet/sec	79.51 Megawatts*

*Power requirements do not include inefficiencies, such as transmission loses, pump loses, or friction in water pipes or other conversion loses. Assumes 100% efficiency.

Note: Of special interest is Red Lake, south of Lake Mead. This area has extensive underground salt water resources. Holbrook also has extensive salt water resources. Often the endorheic lakes are associated with a basin that is larger in area that can be flooded. However, there is often existing development in place. Of interest also is the Wilcox dry lake. This is a national historic site, in that it has a significant amount of ancient pollen. With development of HelioHydroElectric, fresh water can be restored to this lake. It should be noted that with HelioHydroElectric it will put fresh water into existing hydroelectric reservoirs, such as Lake Mead. The Barry Goldwater Air Force Base has large potential. It should be noted also that there are sites on Navaho Tribal Lands, the tribe should consider this as part of their future economic development plans. HelioHydroElectric would put additional rainfall in the area, thus increasing vegetation for sheep, and agriculture.

HelioHydroElectric
Prefeasibility Project
SouthWest USA

UTAH

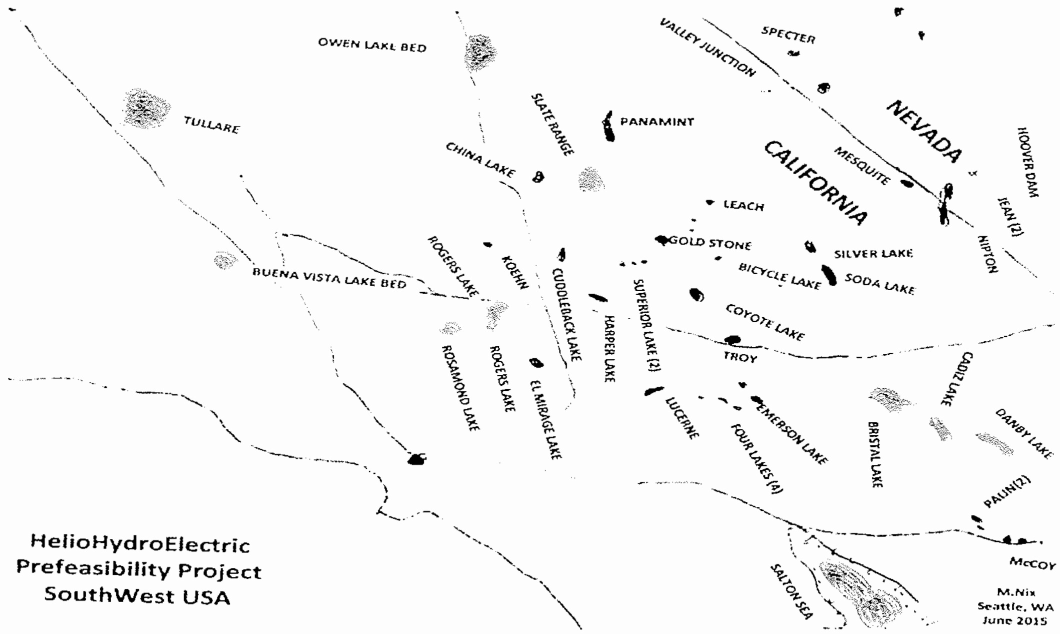


Utah

Name of Site	Evaporation Rate per Day	Evaporation Rate per Second	Power Requirements for Pumping
Great Salt Lake Desert	357,568,000	4138.00	2,293.00
Bonneville Salt Flat	11,151,360	129.00	45.89
Great Salt Lake Dry Lake	338,724	3.90	1.30
Dugway	338,724	3.90	1.39
Cedar Valley Sink	1,393,920	32.20	10.79
Snake Valley Dry Lake	2,787,840	32.20	18.20
Fish Spring Flat	2,787,840	32.20	18.00
Tule Valley	2,787,840	32.20	18.00
Sevier Dry Lake (I)	278,784	3.20	1.80
Clear Lake	6,969,600	80.60	32.09
Sevier Desert Lake (II)	1,115,136	12.90	5.13
Wah Wah Valley	1,393,920	16.13	6.69
Sevier Lake (III)	27,878,400	322.60	133.85
Pine Valley	836,352	9.68	34.0
Totals	417,626,440 cubic feet/day	4829 cubic feet/sec	2,585 Megawatts*

***Power requirements do not include inefficiencies, such as transmission loses, pump loses, or friction in water pipes or other conversion loses. Assumes 100% efficiency**

Note: The military bases near Salt Lake City have extensive HelioHydroElectric resources. Of interest is the New Foundland Evaporation Area. When Salt Lake City is flooded, pumps divert flood water to this area for evaporation. This is the nation's only operational HelioHydroElectric project, though not seen as such. The Great Salt Lake Desert has huge potential for development.

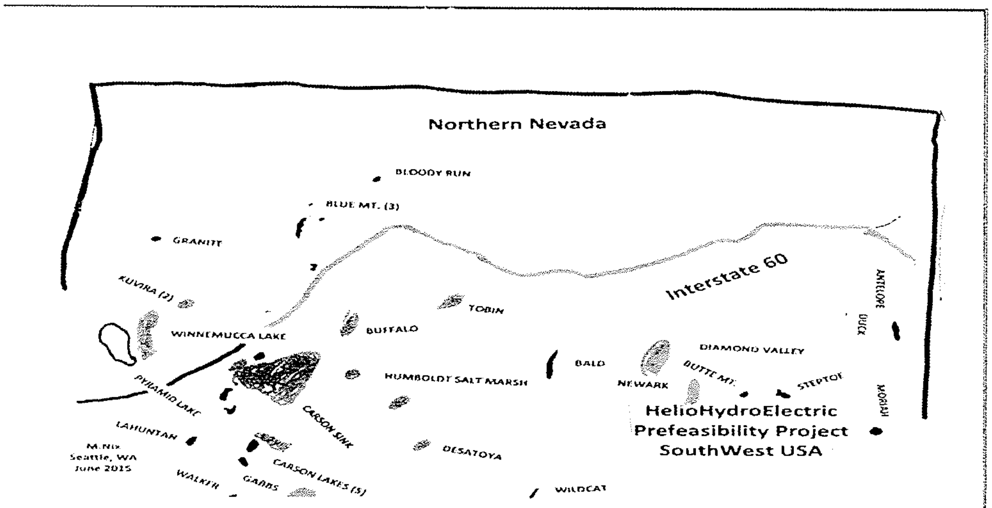


Name of Site	Evaporation Rate per Day	California Evaporation Rate per Second	Power Requirements for Pumping
Owl Lake	278,784	3.20	0.45
Trana Alkali Flat	1,151,360	129.06	19.11
Servies Valley	2,787,840	32.20	4.49
Mesquite Lake	5,575,680	64.53	9.61
Rogers Lake	22,302,720	258.10	53.87
Superior Lakes (3)	836,352	9.68	2.45
Harper Lake	11,513,360	129.06	22.11
Koehn Salt Dale	2,509,056	29.04	4.72
Cuddelback	4,181,760	48.4	10.45
Langford (Fort Irwin)	2,787,840	32.20	4.61
Coyote Lake	6,690,826	77.40	11.07
Silver Lake	836,352	9.68	0.76
Soda Lake (Mojave)	15,581,304	180.00	29.00
Bicycle Lake	6,690,816	77.44	15.37
Drinkwater Lake	1,393,920	16.13	5.58
Nelson Lake	557,568	6.4	1.67
McLean Lake	278,284	3.2	0.62
Ivanpah Lake	10,036,224	116.60	25.64
Rosamond Lake	7,805,452	90.34	17.03
Buckhorn Lake	11,151,360	129.06	24.32
Upper Johnson Valley	1,393,920	16.10	2.18
Galway	557,568	6.45	0.87
Soggy Lake	1,115,136	12.90	1.74
Bagdad Dry Lake	1,115,136	12.90	0.82

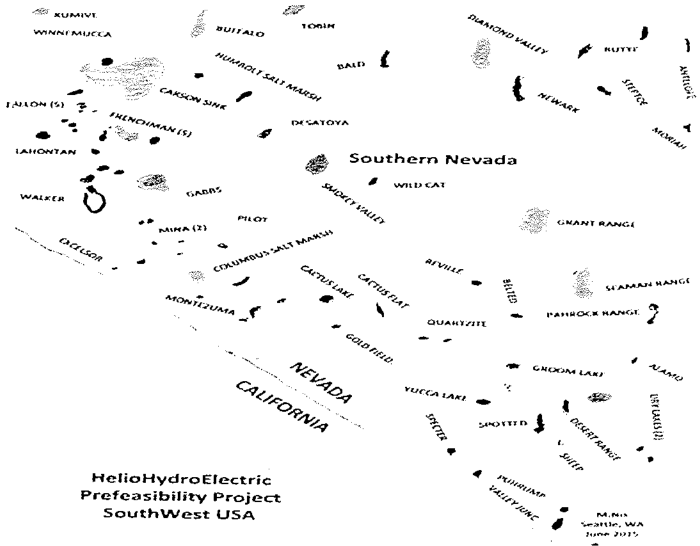
Bristol Lake	27,878,400	322.60	16.39
Cadiz Lake (I)	2,509,056	29.04	1.94
Danby	836,352	9.68	0.64
Trilobite	1,672,704	19.30	1.29
Ward Valley	278,784	3.20	0.82
Upper Surprise Valley	8,363,520	96.80	36.87
Middle Surprise Valley	5,575,680	64.53	24.57
Forty Nine Dry Lake	4,181,760	48.40	18.43
Long Valley Dry Lake	2,782,840	32.20	12.26
Lower Surprise Valley	3,345,408	38.72	14.74
Red Rock	278,784	3.20	1.22
Boot Lake	278,784	3.20	1.24
Grasshopper Valley	2,787,840	32.20	12.29
Little Mud Flat	278,784	3.20	1.00
Duck Lake	278,784	3.20	1.00
Honey Lake	20,351,232	235.50	77.70
Deep Spring Lake	557,568	6.20	2.80
Thibald Pond (Duck)	278,784	3.20	1.00
Airport Lake	836,352	9.68	1.80
China Lake	2,787,840	32.20	6.18
Owens Lake	48,787,200	564.60	169.93
Sheephole	2,787,840	32.20	5.46
Danby Lake	5,018,112	58.08	6.59
Cadiz Lake (II)	6,969,600	80.86	9.18
Bushdale	557,568	6.40	1.00
Palen Valley	2,787,840	32.20	5.34
Cactus Plain	2,787,840	32.20	2.73
Rice Valley	2,787,840	32.20	2.27
Totals	290,439,544 cubic feet/day	3356 cubic feet/sec	706.94 Megawatts*

***Power requirements do not include inefficiencies, such as transmission loses, pump loses, or friction in water pipes or other conversion loses. Assumes 100% efficiency**

Note: Of special interest is Lake Owens. This particular lake has the most severe dust pollution of any lake in the United States. Residents constantly complain of irritation from the dust. There have been failed attempts to restore the lake's habitat. By flushing salt/alkali water through this lake, it will solve the dust pollution, but also add moisture to the region. The Paiutes of Big Pine, CA claim this area as their ancestral home. The tribe should be allowed to develop Lake Owens, as part of their economic planning. Ward Valley has special significance to Native Americans. Ward Valley is the home of the desert Tortoise, a protected species. Any HelioHydroElectric projects will need to be sensitive to these concerns. Many of the other sites already have economic development in place, such as airports. However, there are ways of integrating evaporation projects, so as to co-exist. It is not the intent to pump seawater inland to Death Valley National Park, or other environmentally sensitive areas.


Northern Nevada
BLOODY RUN
BLUE MT. (3)
GRANITE
KUVIRA (2)
Interstate 60
TOBIN
BUFFALO
WINNEMUCCA LAKE
ANTELOPE
DUCK
DIAMOND VALLEY
BALD
HUMBOLDT SALT MARSH
NEWARK
BUTTE MT.
STEPTOE
MORIAH
PYRAMID LAKE
CARSON SINK
HelioHydroElectric
Prefeasibility Project
SouthWest USA
LAHUNTAN
M.Nix
Seattle, WA
June 2015
DESATOYA
CARSON LAKES (5)
WALKER
GABBS
WILDCAT


WINNEMUCCA
NEVADA
CARSON SINK
WILD CAT
RAILROAD VALLEY
WALKER
COLUMBUS
SALT MARSH
COAL VALLEY
CALIFORNIA
PAHRUMP
INDIAN SPRINGS
SALTON SEA



Nevada

Name of Site	Evaporation Rate per Day	Evaporation Rate per Second	Power Requirements for Pumping
Pahroc Dry Lake	5,575,680	64.53	33.87
Seaman	6,696,600	80.60	40.97
Delamar	1,672,704	19.36	10.23
Frenchman Lake	1,115,136	12.90	4.43
Indian Spring Valley	2,787,840	32.20	8.63
Moapa Dry Lake	278,784	3.20	0.32
Arrow Canyon Dry Lake	278,784	3.20	0.32
Dogbone Lake	2,787,840	32.20	6.82
Sheep Desert Lake	8,363,520	96.80	20.40
Pahrump Valley	1,672,704	19.36	4.40
Pahrump Dry Lake	278,784	3.20	0.73
Bonnie Claire	2,787,840	32.20	5.46
Death Valley Junction	557,568	6.40	1.10
Railroad Valley	2,787,840	32.60	13.60
Cave Valley	5,575,680	64.52	33.62
Clayton Valley	8,363,520	96.80	35.41
Silver Peak Alkali Lake	1,115,136	12.90	4.72
Mud Lake (Nellis AFB)	5,575,680	64.53	31.08
Antelope Lake (Cactus Flat)	557,568	6.45	2.73
Railroad Valley (Reveille)	1,951,488	22.50	13.38
Groom Lake (Nellis AFB)	557,568	6.40	2.43
Kavich Valley	1,393,920	16.10	6.82
Buena Vista Valley	5,575,680	64.53	28.51
Carson Sink	1,393,920	161.33	54.22
Humbolt Salt Marsh	1,393,920	16.13	4.70

Grass Valley	4,181,760	48.40	10.24
Diamond Valley Alkali Flat	20,908,800	242.00	133.17
Ruby Valley	6,969,600	80.60	41.51
Goshute Lake	4,181,760	48.40	23.97
Butte Valley	6,969,600	80.60	40.29
Jean Dry Lake	557,568	8.40	1.50
Sarcobatus Flat	8,375,680	96.90	40.12
Amargosa Valley	278,784	3.20	0.72
Big Smokey Valley (Toiyable)	5,575,680	64.50	34.97
Dead Horse	2,787,840	32.20	10.92
Desatoya	6,969,600	80.6	41.29
Labou Flat	557,568	6.45	2.10
Bean Flat	557,568	6.40	3.20
Little Smokey Valley (II)	557,568	6.40	32.0
Newark Lake	836,352	9.68	4.70
Spring Valley	5,575,680	64.50	12.86
Soda Spring Valley	278,784	3.20	1.10
Rhodes Salt Marsh	836,352	9.68	3.50
Columbus Salt Marsh	6,969,600	80.60	30.80
King Desert Valley	6,969,600	80.66	30.04
Gallaher Flat	8,363,520	96.80	36.10
Sob/Burnt/Willow/Garden Lake	1,115,136	12.90	7.86
Black Rock	557,568	6.40	2.18
Smoke Creek (Empire)	27,787,400	322.60	105.22
Blue Mountain Desert Valley	5,575,680	64.50	21.85
Rockland Flat	6,969,600	80.66	37.56
Snow Water Lake	557,568	6.40	3.03
Dry Lake Flat	278,784	3.20	1.50
Double Check	3,624,192	41.94	13.84
Blue Wing Flat	3,363,530	96.80	32.42
Kurnlua Valley	1,115,136	12.90	4.37
Ferney Sink	557,568	6.45	2.18
Middle Lake	557,568	6.40	3.00
Forty Nine Lake	278,784	3.20	1.50
Alkali Flat Lake	1,393,920	16.2	7.64
Mud Lake (Washow)	278,784	3.20	1.51
Cow Lake	278,784	3.20	1.51
Calcutta Lake	278,784	3.20	1.51
Central Lake	278,784	3.20	1.51
Swan Lake	557,568	6.40	2.68
Mosquito Lake	1,393,920	16.10	7.77
Westlake (2)	836,352	9.68	5.10
Massacre Lake	1,115,136	12.90	6.05
Fatty Martin Lake	278,784	3.20	1.70
Boulder Dry Lake	178,784	3.20	1.50
Totals	235,027,072 cubic feet/day	2863 cubic feet/sec	1150.0 Megawatts*

Note: Nevada (and Utah) has a higher altitude than California, thus has higher energy requirements for pumping. The state has numerous small sites that can be exploited.

SUMMARY OF RESULTS

Name of Site	Evaporation Rate Cubic Feet per Day	Evaporation Rate Cubic Feet per Second	Power Requirements for Pumping Megawatts
USA-Mexico Border	43,769,088	504.76	168.52
New Mexico	34,569,216	399.90	88.60
Arizona	48,655,564	591.00	79.51
Utah	417,626,440	4829.00	2585.00
California	290,439,544	3356.00	706.95
Nevada	235,027,072	2863.00	1150.00
GRAND TOTAL	1,070,086,924 cubic feet/day	12,542.00 cubic feet/sec	4778.58 MegaWatts*

***Power requirements do not include inefficiencies, such as transmission loses, pump loses, or friction in water pipes or other conversion loses. Assumes 100% efficiency.**

SOLAR PONDS: One source for small ranches and farms for HelioHydroElectric are Solar Ponds. These are small salt lakes. These can be covered optionally by a greenhouse, which can distill water from condensation. The graduate heat difference between the bottom and top of the salt lake can generate small but significant amounts of electricity, using heat transfer fluids. Furthermore, these can grow algae for farm fuels. These can add small but significant moisture to a local ranch.

SOURCES OF SALT WATER: There are two major sources of water for evaporation lakes. The first is the ocean itself. Pipes and canals can be constructed, perhaps paralleling highways. One proposed route is along the USA- Mexico border. (Good borders make for good neighbors). Another source of salt water is underground aquifers. Underneath Arizona, Utah and Nevada is a huge underground ocean of alkali water. This geologic aquifer is so huge, it is rumored the US Navy has been exploring with submarines. Using solar and wind power pumps, this underground alkali water can be pumped to the surface. It should be noted that the chemical makeup of ocean water is different from underground alkali water. Underground alkali water is ancient water, with the chemical makeup of oceans many centuries ago.

FLUSHING SALT BRINE: It is proposed that an underground tunnel pipes be built, using either cut-and-cover technology, or deep bore tunneling. The construction of these Salt Brine Tunnels will flush salt from the evaporation lakes, thus extending their useful lives. Thus, returning the salt from evaporation back to the ocean. This makes these evaporation sites sustainable in the future. The ocean is approximately 3% salt. Concentrated salt brine (i.e. 27%) can then be piped back to the ocean. These Salt Brine Tunnels would parallel the planned canal/pipes, and would be smaller diameter, since their major purpose is transportation of concentrated salt. The constant flushing of these evaporation lakes will help in control of algae, and make the lakes more habitable for wildlife.

MICROCLIMATE EFFECT: It should be noted that once these salt dry lakes are flooded with salt water, the evaporation from rain water builds up in the surrounding mountains and plains. Fresh rain water is locked up in plants, fresh water lakes, and underground aquifers. Plants and trees also add moisture to the air. Each year, the evaporation is cumulative. The first year, for example, one cubic mile of fresh rain water is added to the environment, the next year another cubic mile, the year following another cubic mile. Gradually moisture builds up in the local environment. Of note, the Great Salt Lakes in Utah has its own microclimate effect that can be used as a model of other HelioHydroElectric projects. Still, conservation efforts, such as water retention, soil control and also rain barrel water storage on homes and buildings should be implemented. Evaporation from farms, algae farming, salt evaporators, forest, fresh water lakes, and so on, add additional rainfall. As a general rule, evaporation from lower desert regions travel to mountain tops for rain. Due to the jet stream, weather travels primarily from the west to the east.

IMPACT ON GLOBAL WARMING: The additional rainfall in the desert should increase the amount of vegetation. The vegetation will remove carbon dioxide from the atmosphere. With the upcoming treaty conference in Paris, in December, a HelioHydroElectric Treaty can be proposed by the United States, so as to offset carbon dioxide emission. Development of HelioHydroElectric projects, will increase the amount of moisture in deserts, replenish underground fresh water aquifers, and increase the amount of snow pack in mountains. It is estimated that these will restore water in the Colorado and Rio Grande rivers. This should be of special interest to the Interstate Compact states of Utah, New Mexico, California, Nevada, Colorado, Arizona, and Wyoming.

POWER REQUIREMENTS: The power requirements to pump this large volume of seawater inland are huge. However, this is not impossible. While it is beyond the scope of this Prefeasibility study, it is believed by the author that with rapid development of solar energy, and with energy conservation, it would make this electrical power available for salt water pumping. There are numerous technologies that can be implemented, including Photovoltaic panels on residential and commercial buildings. (These make the meter run backwards.) The list is nearly endless in solar technologies that can be implemented to achieve electricity conservation: solar hot water, solar cooking, solar salt water distillation, solar lighting, micro wind turbines, paddle wheel systems on canals, solar greenhouses, rain barrels, solar smelters, solar water pumping, solar powered air conditioning, night sky radiation refrigeration, biomass conversion, biofuels, energy efficient appliances and so on. This technology would employ people, and would be a new export industry. A lot of the problem of electrical supply is lack of capacity in the distribution and transmission lines. With better load management, energy self-production, and conservation, it would make electricity available for the HelioHydroElectric projects. The goal would be to have people "make their own energy". Good models to follow are the efforts of Denmark, Netherlands, and Germany.

BIOFUEL PRODUCTION: These flooded salt lakes also have another gift: algae. Algae can be converted to biofuels. Thus creating a new energy source. The airlines are exceptionally interested in BioJet fuels made from algae. Calculations for the potential of biofuels was not done, but can be done as part of the feasibility study, thus offsetting the cost of construction. The amount of carbon dioxide removed from HelioHydroElectric development has not been calculated, but can be.

NATURAL GAS OPTION FOR SEAWATER PUMPING: Natural gas is often used for irrigation pumping. There are sufficient natural gas supplies in the region. Often times it is a waste product from oil production, where natural gas is flared. Natural gas can be used for pumping seawater for the HelioHydroElectric project. The goal is to make this project sustainable from generation to generation in the future. If natural gas is utilized, plans should be implemented for eventual conversion to solar and wind energy. This can be done. For example, solar energy can break down water to hydrogen. It is feasible to convert coal power plants, natural power plants (and even nuclear power plants) to be powered by solar energy. The technology exists. It is unknown if the amount of carbon dioxide generated by natural gas combustion would be offset by the additional vegetation grown, but this can be determined. It will be necessary to use natural gas for construction materials for the project. Concrete for pipes and canals would be need natural gas to power the factories. It should be noted that the heat of exhaust (as from a natural gas generator) or steam from a cooling tower, can evaporate salt water so that it adds additional rainfall to the region. Natural gas when combusted, creates water vapor and carbon dioxide. Natural gas is an option.

BETTER LOAD MANAGEMENT OF EXISTING ELECTRICAL SYSTEM: It will be impossible to achieve electrical stability with traditional "flat rates", where everyone pays the same. All electrical power does not cost the same to generate. Nuclear power being the most expensive, while hydro power is often the lowest. Often times the various energy sources for generation for electrical power is averaged, mixing the cost together. By going to a "the more you use, the more you pay" rate structure, it will encourage "mega wasters" to conserve. For example, the first 500 Kilowatts would be 3 cents per Kilowatt; the second 500 Kilowatts would be 6 cents, the next 500 Kilowatts 9 cents, and so on. A low income grandmother, for example, who only uses a small amount for a light and a refrigerator, would only pay a few dollars a month. However, someone with a large mansion, who consumes nearly 100,000 Kilowatts, would pay on upwards to $1000 a month. It would give the mansion owner an incentive to install solar panels, or implement conservation measures. It would employ people installing the equipment. Another option for business would be Time of Day Metering, where in day, when there are shortages of electrical power; a business would pay say, 50 cents per Kilowatt. But at night when electrical is very available, the business could pay only 5 cents per Kilowatt. This gives business a financial incentive to implement conservation and energy self production. It is beyond the scope of this Prefeasibility study to discuss load management, but this could be a method to make electricity available for the large amount of electricity required for pumping for the HelioHydroElectric project.

TRANSPORTATION ISSUES: Transportation is one of the biggest consumers of energy. It is encouraged that more efficient, and less carbon intensive forms of transportation be implemented. Over dependency on Single Occupancy Vehicles is very wasteful and costly. The cost of highways and parking and related infrastructure is huge. However, by implementing different forms of transportation, such as a national bicycle trail system next to every federal and state highway, better rural transit, and alternative fuels, it will reduce the cost of living, thus allowing for better financing of construction of HelioHydroElectric. Driverless cars, and postal service delivery via drones flying over highways, adds a futuristic dimension. Construction of HelioHydroElectric sites will put a demand on the transportation system.

MILITARY INVOLVEMENT: What we need is a Declaration of War on Global Warming, not "nation vs. nation". It is ironic to think that the battle front line is on the military bases, but U.S. military bases do have extensive HelioHydroElectric sites. The military can construct these projects, as part of the capital budget plans.

CONCLUSION: To sum, if HelioHydroElectric was fully developed in the Southwest United States (and Northern Mexico) it should generate nearly 1 billion cubic feet each day of rainwater. To put that in perspective, the Colorado River has a maximum recorded flow rate of 384,000 cubic feet/second, and a minimum flow rate of 422 cubic feet/second. One billion additional cubic feet of rain water would provide the Colorado River with an addition 11,574 cubic feet/second of rain water. The average flow rate for discharge is 22,500 cubic feet per second. The power requirements for water pumping are not outlandish as is commonly believed. It is estimated the pumping requirements including inefficiency to be about 10,000 Megawatts. To put this in perspective, California has an installed capacity of 202,444,000 Megawatts. It should be noted also this is not the maximum potential for HelioHydroElectric. Additional sites can be developed, such as West Texas. This is not the upper limit of capacity. With the production of 364 Billion cubic feet per year of HelioHydroElectric produced rain water, this is the equivalent of 8,356,290 acre feet, or about 20% of the total water usage of the state. Development of HelioHydroElectric would match the current demand for Municipal usage. To illustrate the potential, 364 billion cubic feet each year of rain water would cover 130,567 square miles with 12 inches of rain each year. Or generate 24 cubic miles of rain water each year.

State governors should seriously consider appointing a Blue Ribbon Commission to develop construction plans. The potential for HelioHydroElectric development is huge, it is encouraged that further analysis be done, and projects implemented.

ABOUT THE AUTHOR: Martin Nix is the founding secretary of Solar Washington, a group dedicated to promotion of solar technology in the State of Washington, USA. He has 9 U.S. patents in solar technology. He is a graduate of the University of New Mexico, and North Seattle Community College. He attended the School of Regional Planning and Architecture at UNM, and also the School of Engineering at NMSU. B.U.S., A.A.S.

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