



# Bella Machines

21457 SW 95th Court, Tualatin, Oregon 97062

## **Executive Summary:**

### **TRANSFORMED HYDRAULIC POWER: A SOLUTION TO CALIFORNIA'S WATER PROBLEMS**

#### **Why is a new technology needed to solve California's water shortages?**

Water problems are nothing new to California, and many battles have been fought over water in California's history. The current conveyance system has led to endless conflict. Climate change and population growth have made California's water shortages even worse. The projected shortfalls have made alternatives worth exploring. A variety of projects have been implemented, but have fallen short of providing lasting relief.

California's water woes require more than just band aid fixes. New water must be part of the solution and the best way to accomplish that is through desalination. Rather than littering Southern California's pristine coastline with dozens of industrial eyesores, we propose a bold plan: Build one large capacity underground plant in Sylmar, using a renewable energy technology called Transformed Hydraulic Power (THP).

An underground system is the best plan for future success. It would use Beach Wells to gather seawater while posing no harm to sea life. It would incorporate a Stormwater Capture system to prevent intense storm water from washing out to sea. It would encounter less public opposition, because no part of the system would be visible from the surface. Finally, it would use THP as a power supply, reaffirming California's leadership in combating climate change.

#### **What is Transformed Hydraulic Power?**

Transformed Hydraulic Power (THP) is a unique method to generate power from a renewable energy resource. Most hydropower plants use the act of falling water to generate electricity. Though electricity is a very versatile power source, it is not always the most efficient way to power the machinery of mankind. THP is a more efficient way to harness the power of falling water by creating a new energy system, not just a new machine.

Approximately 50% of all electrical energy is lost during transmission, and currently there is no efficient way to store electrical energy. Since electricity can't easily be stored, that means you must "use it or lose it." THP would directly link our nation's undeveloped hydropower to our nation's growing energy needs.

Since hydropower can be stored, power will only be produced as it is needed. There will be no need to have generators running 24-7 just to keep the wires hot. THP was created to combine a hydropower plant with one of the largest energy consumers out there, pumping water. THP uses falling water from one source to pump water from another. This is called water-to-water energy conversion. "The Los Angeles Desalination Project" is a proposal that would utilize THP.

This proposal is the most sustainable, lowest carbon footprint, long term solution to California's water problems.

#### **How is Transformed Hydraulic Power better for the Environment?**

In order to solve the climate crisis we need to transform our energy system to carbon free sources. THP is a renewable energy source with no Green House Gas emissions. THP also has a greater overall system efficiency which allows it to achieve double the work output of standard hydropower systems. Reverse Osmosis

Desalination plants require great amounts of energy because pumping water is energy intensive. THP is ideal for desalination because of its ability to pump seawater through membranes at the lowest carbon footprint.

The health of the Delta ecosystem has been in decline for years and most agree that something must be done. A federal ruling in 2007 has limited pumping from the Delta to Southern California in order to protect endangered fish. New water generation in Los Angeles will benefit the Delta ecosystem by reducing pumping demand. Reducing pumping from the Delta will also benefit climate change because pumping requires so much energy. An energy analysis of the State Water Project (SWP) shows that it takes 3.81 MW\*Hr/Acre\*ft to pump water from the Delta to Los Angeles, but the Los Angeles Desalination Project could generate 2 billion gallons per day of new water for the same energy per volume.

One of the byproducts of desalination is brine. Many believe that simply dumping this back into the sea may be harmful to sea life. The Los Angeles Desalination Project will explore ways to convert brine into useful products such as table salt and hospital grade saline solution via business partnerships. Salt is mined in many parts of the world and has market value. Coupling desalination plants with salt production facilities may prove to be cost effective as well as carbon neutral.

### **How much water will the Los Angeles Desalination Project produce?**

Preliminary data for the Los Angeles Desalination Project estimates that it would generate 188 million gallons per day from THP alone. By combining the carbon free water from THP, and the electric water from energy savings (by reducing SWP pumping), this new plant's startup capacity would generate up to 1 billion gallons per day (1,120,000 Acre\*ft/yr) of new water. This is why the Los Angeles Desalination Project holds the most promise to meet California's current and future water needs, while doing it with the lowest carbon footprint.

### **How much is the Los Angeles Desalination Project going to cost?**

It's appropriate to compare the Los Angeles Desalination Project to the proposed Delta Tunnels project to analyze the benefits and costs. The Delta Tunnels project is designed to convey water directly from the Sacramento River to the Clifton Court Forebay and is estimated to cost between \$25 and \$67 billion, while producing no new water. The Los Angeles Desalination Project is a better alternative with an estimated cost of \$35 billion, and would produce up to 2 billion gallons per day of new water. The Delta Tunnels is plagued with hidden costs not accounted for in the estimated \$67 billion price tag. Mitigation costs involving utilities, businesses, homes, farms, and wildlife near the Delta Tunnels construction site would be very expensive. The Los Angeles Desalination Project, in contrast, is expected to have minor mitigation costs because 80% of the construction would occur in the Mojave Desert and the remainder would be underground.

### **What can we do to get started?**

The Los Angeles Desalination Project needs to be on the table for the serious consideration by California residents and decision makers. A Feasibility Study for the Los Angeles Desalination Project should be conducted so the people of California will have the facts about their choices. The Feasibility Study would be conducted by a third party to examine the viability and costs of building an underground state-of-the-art desalination plant in Sylmar with built-in renewable energy. The State has spent over \$200 million writing the Bay Delta Conservation Plan. The Feasibility Study, in comparison, is estimated to cost \$2 million. Isn't it reasonable to investigate an alternative solution, when the future of California's water for generations to come, is at stake?



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