Option Submittal Form

Contact Information (optional):

☐ Keep my contact information private

Contact Name: _____ Title: _____

Affiliation: _____

Address: _____

Telephone: _____ E-mail Address: _____

Date Option Submitted: February 1, 2012

Option Name:

Reduce Surface Water Evaporation via Floating Photovoltaics or Plastic Balls

Description of Option:

By installing solar panels floating on lakes, lagoons or ponds, the panels are naturally cooled, resulting in improved power production. In turn, the solar panels shade the water, limiting algae growth and helping reduce evaporation. (Source: http://www.waterworld.com/index/display/article-display/2918426609/articles/waterworld/water-utility_management/2011/09/floating-solar-systems-provide-power-environmental-benefits.html?cmpid=EnlWaterWorldCISCRMOctober272011)

High surface area coverage is achieved by placing a sufficient amount of plastic balls on the surface of the liquid. The balls arrange themselves to provide coverage of up to 91%. The result is a thermal insulation barrier which combines the insulation factor of the air held in each ball with the poor heat conductivity of plastic. While the air pockets between the balls are not sealed, they also contribute to this insulation system, which dramatically reduces heat loss and light transfer. The cover also reduces liquid loss through evaporation and prevents odor problems. (Source: http://www.paradisenw.com/armor_ball_cover.php)

Location: Describe location(s) where option could be implemented and other areas that the option would affect, if applicable. Attach a map, if applicable.

Any lake, reservoir or water body

Quantity and Timing: Roughly quantify the range of the potential amount of water that the option could provide over the next 50 years and in what timeframe that amount could be available. If option could be implemented in phases, include quantity estimates associated with each phase. If known, specify any important seasonal (e.g,. more water could be available in winter) and/or frequency (e.g., more water could likely be available during above-average hydrologic years) considerations. If known, describe any key assumptions made in order to quantify the potential amount.

An environmental engineering firm that evaluated this technology concluded that water evaporation under the floating arrays decreased by 70 percent. The timing of the project will largely depend on the size of the water body and how many solar arrays that the project will be installing. It is estimated that Singapore's Tengeh Reservoir, 2 Megawatt floating photovoltaic system will take 2 years.

(http://www.nytimes.com/2011/04/20/business/energyenvironment/20float.html?_r=1&pagewanted=all)

Additional Information

Technical Feasibility: Describe the maturity and feasibility of the concept/technology being proposed, and what research and/or technological development might first be needed.

The technical feasibility of floating photovoltaic systems is currently being investigated. In 2010, Solaris partnered with EDF Group, the world's largest utility company, to install its floating concentrated photovoltaics on a reservoir in Provence, France. The pilot project will help determine the feasibility of stacking power-generation opportunities and, hopefully, uncover new ways to produce more power from existing facilities rather than affecting new ecosystemshttp://www.ecomagination.com/bobbing-for-power-floating-solar-panels-show-potential. An $11 million pilot project in Singapore, estimated to have a system size of 2 megawatts, will assess the feasibility of floating solar PV systems on water as an alternative to rooftops (http://www.todayonline.com/Business/EDC111103-0000084/Floating-solar-panel-at-Tengeh-Reservoir).

Costs: Provide cost and funding information, if available, including capital, operations, maintenance, repair, replacement, and any other costs and sources of funds (e.g., public, private, or both public and private). Identify what is and is not included in the provided cost numbers and provide references used for cost justification. Methodologies for calculating unit costs (e.g., $/acre-foot or $/million gallons) vary widely; therefore, do not provide unit costs without also providing the assumed capital and annual costs for the option, and the methodology used to calculate unit costs.

The Singapore floating project ($11 million) will be a public and private partnership, where the government agencies will work with interested private-sector companies to build the system (http://wildsingaporenews.blogspot.com/2011/11/singapore-to-set-up-11-million-floating.html).

Permitting: List the permits and/or approvals required and status of any permits and/or approvals received.

Potential for Solar Panel Permit Requirements

Legal / Public Policy Considerations: Describe legal/public policy considerations associated with the option. Describe any agreements necessary for implementation and any potential water rights issues, if known.

NA

Implementation Risk / Uncertainty: Describe any aspects of the option that involves risk or uncertainty related to implementing the option.

This a relatively new concept and infrastructure to places solar arrays haven't been standardized therefore there is a risk that equipment failure may occur and the solar arrays could sink.

Reliability: Describe the anticipated reliability of the option and any known risks to supply or demand, such as: drought risk, water contamination risk, risk of infrastructure failure, etc.

The reliability of photovoltaic technology has been thoroughly studied and more and more efficient photovoltaic technologies are being discovered. However, the feasibility that floating photovoltaic saves a significant amount of water is still being studied.

Water Quality: Identify key water quality implications (salinity and other constituents) associated with the option in all of the locations the option may affect.

There have been concerns over the plastics of the balls leaching chemicals but, there has been no harm or adverse effects from the plastics; they are considered to be 'environmentally safe'.

David L. Sedlak, a professor of civil and environmental engineering at the University of California, Berkeley, agreed that the floating solar power plants could prove useful in controlling algae [improving water quality]. (http://www.nytimes.com/2011/04/20/business/energyenvironment/20float.html?

Energy Needs: Describe, and quantify if known, the energy needs associated with the option. Include any energy required to obtain, treat, and deliver the water to the defined location at the defined quality.

Energy Required	Source(s) of Energy
None	Floatovoltaics would actual help facilitate energy needs

Hydroelectric Energy Generation: Describe, and quantify if known, any anticipated increases or decreases in hydroelectric energy generation as a result of the option.

Location of Generation	Impact to Generation
NA	NA

Recreation: Describe any anticipated positive or negative effects on recreation.

Locations	Anticipate Benefits or Impacts
Reservoir	Installation of solar arrays on reservoirs could reduce recreational area flexi

Environment: Describe any anticipated positive or negative effects on ecosystems within or outside of the Colorado River Basin.

Locations	Anticipated Benefits or Impacts
NA	NA

Socioeconomics: Describe anticipated positive or negative socioeconomic (social and economic factors) effects.

NA

Other Information: Provide other information as appropriate, including potential secondary benefits or considerations. Attach supporting documentation or references, if applicable.

NA