

# Solar Canals: An alternative to Advance Renewable Energy Production and Water Conservation Efforts

Lamboglia Conrado Cayetano

Universidad Tecnológica Nacional – Facultad Regional Paraná

**Abstract** Nowadays there are many cities around the world that have many kilometers of canals to provide clean water to citizens and they must take care of them. Solar canals are an alternative in these cases: by placing solar panels over canals, energy is absorbed and water loss through evaporation is prevented. Although this system can be expensive, in some projects this alternative could be more cost-effective than currently used renewable energies systems. This paper aims to delve into the characteristics of solar canals that turn these systems into a new viable option to produce renewable energy and prevent water loss in cities that can afford this type of projects. This paper describes solar canals, its requirements, the structure that supports them, advantages and disadvantages, and the kind of places in which they can be used. It is expected that this paper can provide information about an innovative energy generation system in order to improve the environment and fight against climate change.

**Index Terms**— Evaporation, renewable energy, solar canals, solar panels, water loss.

## I. INTRODUCTION

Given the issues connected with climate change that humanity is experiencing around the world and the efforts to search for better alternatives, new methods have now been designed to improve it. Thanks to technological advances and new discoveries made by specialists, there are new proposals, which must also come with citizens' education about the problems the world is facing.

According to the Sustainable Development Goals Report 2020 [1], goal number 6, which aims to ensure clean water and sanitation, has become very important due to the worldwide sanitary emergency provoked by the COVID-19 pandemic, because it is essential that everyone has access to clean water and sanitation to protect human health, and prevent this pandemic from lasting more than it should. As well as this, goal number 7 aims to ensure affordable and clean energy to millions of people around the world that do not have access to electricity, and this should be a basic service that everyone should have access to. In this time of

COVID-19, the usage of energy in hospitals and health facilities has greatly increased, so it is essential to find new methods to obtain renewable energy.

Water is a resource that despite covering 70 percent of the planet it should not be wasted because it is a renewable resource if it has adequate controls. Otherwise, it is a non-renewable resource. Taking this into account, different projects are designed to make water renewable but the problem is that these methods are expensive, and many governments do not have the resources to deal with this problem which is affecting the planet in the present and it is going to get worse in the future.

Energy is a renewable resource and there are different methods to generate it. In this case the problem is that the cheapest way to do it impacts the environment negatively, so the most important challenge in the present is to find new methods that do not cause any more damage.

The objective of this article is to provide information about the Solar Canals as an alternative to make renewable energy and to prevent water loss [2]. First, it describes the concept this system is based on, its requirements and how the structure is made up, its benefits and potential, its

Conrado Lamboglia is a student of the career of Civil Engineering at the Universidad Tecnológica Nacional, Facultad Regional Paraná (e-mail: conraa3@gmail.com).

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United Nations' Sustainable Development Goals frameworks. If sources have not been well paraphrased or credited, it might be due to students' developing intercultural communicative competence rather than a conscious intention to plagiarize a text. Should the reader have any questions regarding this work, please contact Graciela Yugar Tófaló, Senior Lecturer, at [gyugar@frp.utn.edu.ar](mailto:gyugar@frp.utn.edu.ar)



below solar panels helps them to remain cool, which increases their efficiency [4].

The potential of this project is that every 24.000 kilometers of canals, the amount of energy that is produced is 18.000 Megawatts. This system also helps save up to 200 billion liters of water each year.

At present, transmission costs are a heavy cost in the electricity business, and there are also massive transmissions losses, so the use of the solar canals in areas of countries that are energy-deficient, the financial savings derived from avoided transmissions losses could cancel out the additional costs of building and operating solar canals [5].

#### D. Disadvantages

The main disadvantage that solar canals face is the cost of infrastructure. The reason for this is that they are supported by steel trusses or suspension cables, both of which are more expensive to build than traditional support structures for ground-mounted solar panels [1]. Besides, it is more difficult to maintain and operate solar canals, since technicians must build and climb ramps to clean the panels. A further disadvantage is that the technicians use specialized equipment to maintain the underwater support structures, and these supports must be galvanized with a protective zinc layer [4].

Another disadvantage that solar channels have is that to be able to take advantage of their capacity to generate energy they must use a large amount of land, the estimate is 1 MW PV plant on a 750 meter stretch of canal [6].

A study also must be done to know the environmental future effect the project will have on the lands. For example, the specialists must analyze the algal blooms that is a common problem that generates bad odors such as fish or herbs [4].

#### E. First Test

The first test of this method was carried out in Gujarat, which is a small and dusty village in western India. This small village of 40 homes with thatched walls and tin roofs was one of rural India's many communities that, until recently, did not have electricity. In its recent history, India has depended on coal-fired power energy plants, which by official information generates 72% of the country's electricity in 2018-19, so the challenge was to find a solution so that Gujarat can have electricity. The answer has been to cover its canals with solar panels, as a solution that saves land, water, and carbon emissions in one.

This project started with a pilot of 750 meters to check if it worked based on what was designed [7]. At present this project has 40 Km. and it has been expanded to more states such as Punjab, Karnataka o Kerala, with the objective of increasing the project nationwide so that many villages can have access to electricity [8].

### III. CONCLUSION

Given the current conditions on our planet, today it is necessary to look for alternatives to make it healthier, since climate change is one of the main problems we face as a society and we cannot ignore it. Therefore, solar canals are an alternative to the common ways of generating energy such as oil, coal, natural gas, and in areas far from the population, such as villages with farms and that have many kilometers of canals. A solution today is solar canals for their mutual benefit both to make renewable energy and prevent water loss. They are not only designed for cities or villages, since in the present a state like California, that is very important in the United States, is planning to use solar canals. This could be a global change about this new way of obtaining energy in a renewable way.

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