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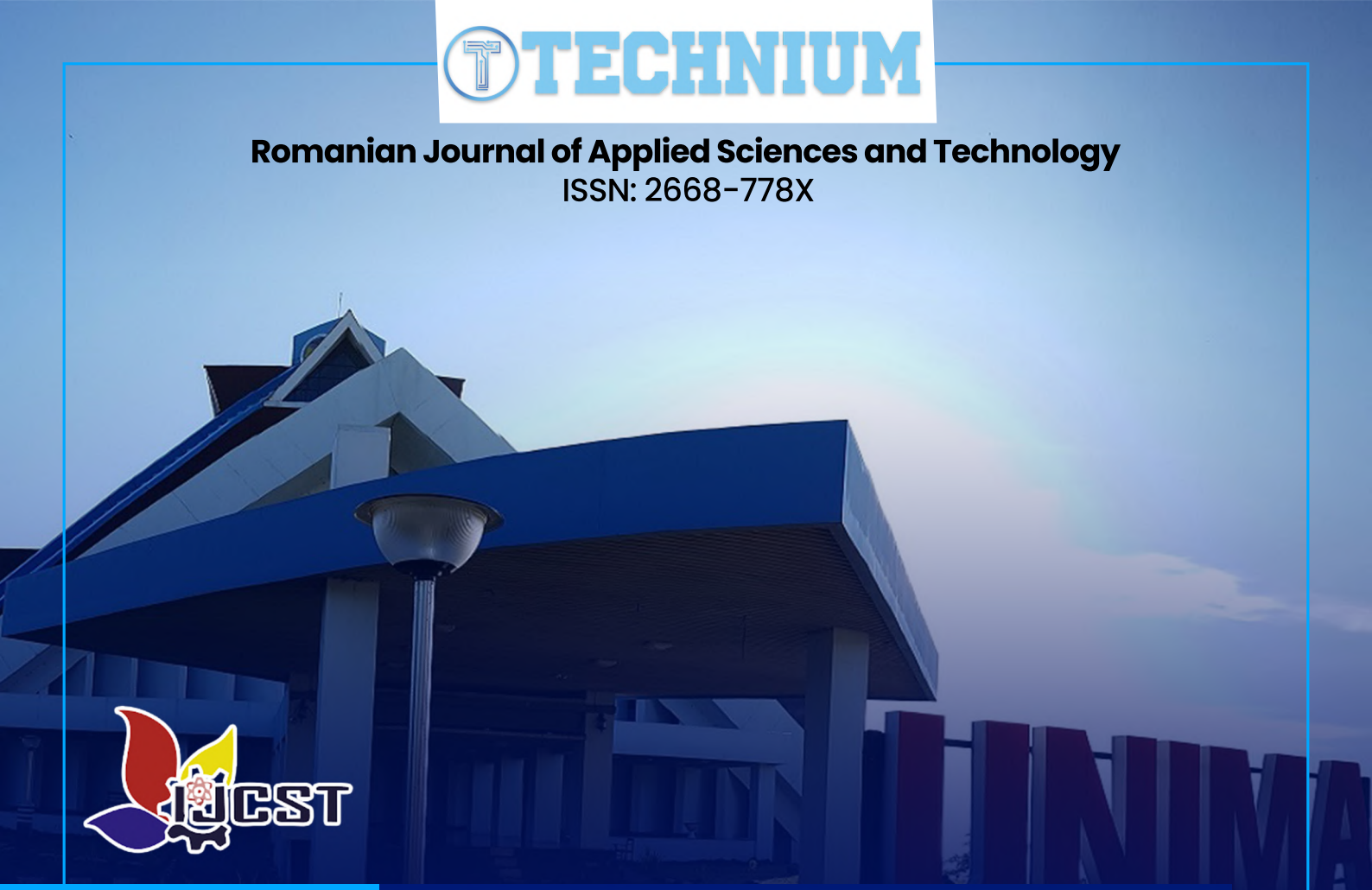

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Floating Photovoltaic Potential in the Rawa Biru Area of South Papua Province

Johan Karim[1], Damis Hardiantono[2], Hariyanto Hariyanto[3]*

[1,2,3]Departement of Electrical Engineering, Faculty of Engineering, Musamus University of Merauke - Indonesia

[*]e-mail: damiz@unmus.ac.id

Abstract. National energy policy and renewable energy development policy towards 23% in 2025, the first target is to increase solar energy capacity as a priority where development includes rooftop solar power plants, large scale solar power plants, and floating solar power plants. The legal basis for the development of renewable energy is the policies of the central government and regional governments through regulations made. South Papua with the potential of Rawa Biru which is one of the sources of clean water in Merauke. Rawa Biru with a watershed area (DAS) of 4,791.671 km^2 and an actual water body area of 95 ha. Simulation is done using Google Earth and Solargis software. Potential of floating PV in Rawa Biru with data maps, solar azimuth and PV configurations. Area of 95 ha floating PV potential 53,25 MWp, generating potential 79,93 GWh/year and area of 8 ha floating PV potential 2,14 MWp, generating potential 3,24 GWh/year.

Keywords: *Floating Photovoltaic, Potential, Rawa Biru, South Papua Province*

1. Introduction

The President's speech at the MPR annual session and the joint session of the DPR and DPD emphasized that the Transformation towards new and renewable energy, as well as economic acceleration based on green technology, will be an important change in our economy [1]. The target of 23% renewable energy mix in 2025 and decarbonization in 2060 forms the Indonesia Solar Energy Outlook (ISEO) 2023 [2]. The project pipeline for large-scale PLTS is being boosted by floating PLTS (floating PV) where the target is reservoirs in Indonesia and combination of capacity with profit [2][3]. Floating PV must be away from strong currents or strong waves and river flows. Based on the Indonesia Solar Energy Potential Map from Ministry of Energy and Mineral Resources, the solar radiation in Indonesia is ranging from 2.81 to 5.27 kWh/m^2/day with energy potency applies to Indonesia land cover areas reach 3,550 GW [4] and the largest in Southeast Asia, namely the Cirata area in West Java with a capacity of 145 MWp [5]. The development of floating PV is intensively carried out to increase the electricity sector [6]. Analysis related to shallow water bodies and high utilization of desalination with diesel [7][8]. Geographical location and pollution-free environment [9][10]. South Papua has a rain-fed area and is a source of drinking water, namely the Rawa Biru area which is in the Sota district which is adjacent to the Papua New Guenia border [11]. Freshwater management plant Rawa Biru as utilization optimization of natural resources and the Rawa Biru watershed (DAS) has an area of 4,791.671 km2 with a body area of 95 ha [11].

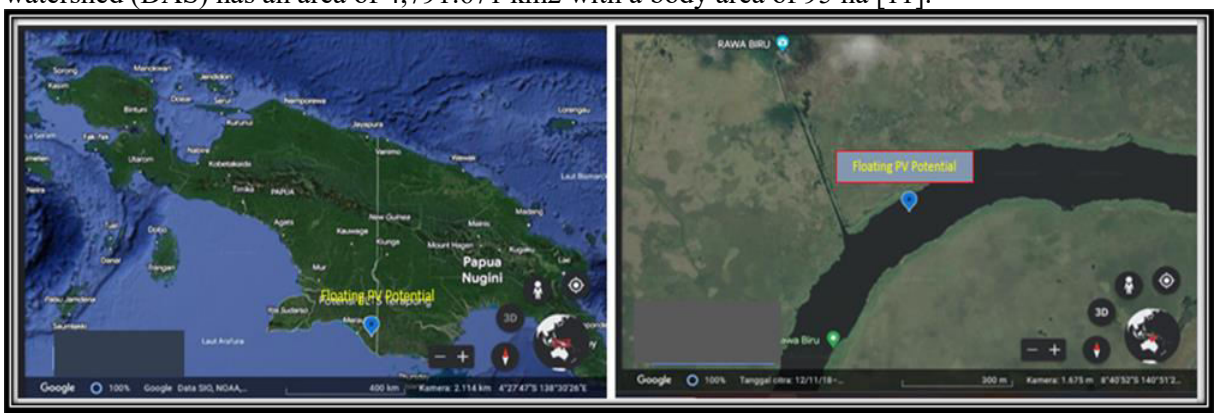

Fig. 1. The location of the floating PV potential area in Rawa Biru, South Papua

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2 Research Method

Direct observation of the location of the Floating PV potential area in the city of Merauke, Sota district. Using the experimental version of the Google Earth Method to analyze the potential of the Blue Swamp and the Solargis Map Method for large scale Floating or Floating PV simulations.

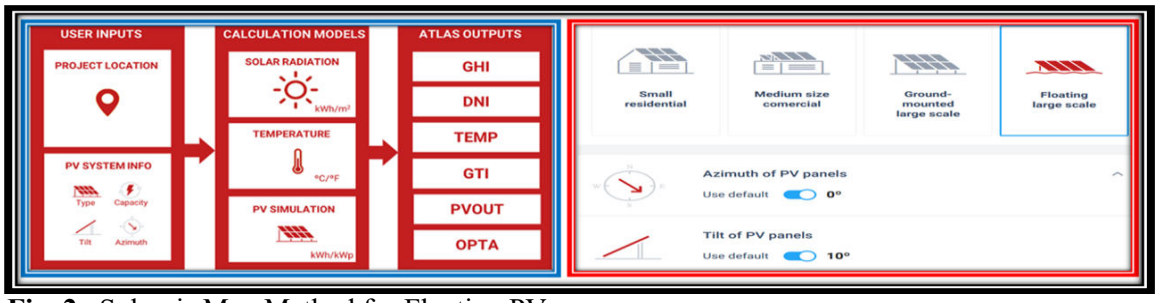

Fig. 2. Solargis Map Method for Floating PV area

3 Results and Discussion

3.1 Rawa Biru coordinates and model design

The Rawa Biru protected area is always guarded and is included in the Wasur National Park (WNP) area which is directly bordered by the Maro River to the north and Arafura Sea to the southern [11], the location shown in the google earth map with coordinates 140^0 51' 26" BT- 08^0 40'41" LS had potential of the sun and energy production [12][13].

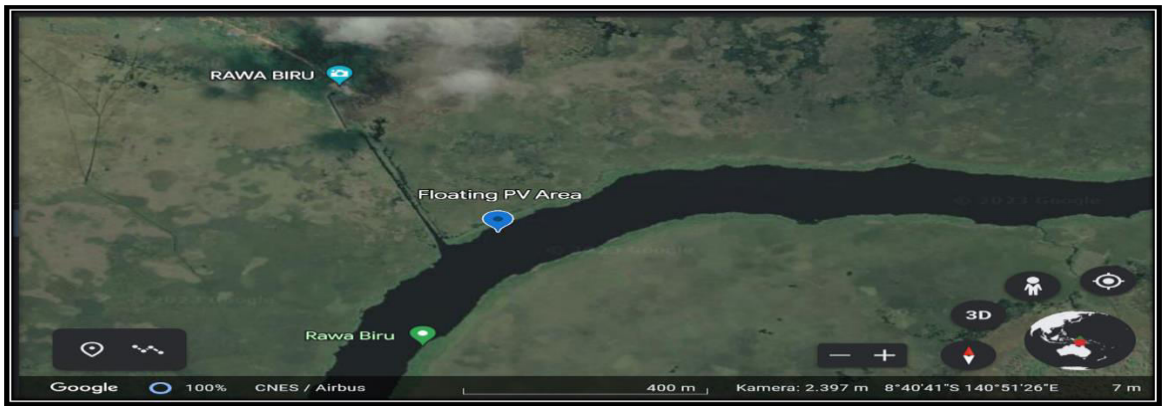

Fig. 3. The location of the Rawa Biru coordinates

Design model for floating PV in the Rawa Biru area with an area of 8 ha at a position near the entrance to the Rawa Biru Post.

Fig. 4. Area floating PV

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Table 1. The Potential of Floating PV in the Rawa Biru

Size/area	Rawa Biru area	Floating PV Potential	Generating Potential
Medium size **(10 – 100 ha)**	95 ha	53,25 MWp	79,93 GWh/year
Small size **(< 10 ha)**	8 ha	2,14 MWp	3,24 GWh/year

3.2. Results with Solargis Models

Map data DNI 1098,9 kWh/m^2, GHI 1689,9 kWh/m^2, DIF 912,3 kWh/m^2 and GTI 1701,3 kWh/m^2. PV modules/OPTA 8/0 , air temperature 26,6 ^{0}C, and elevation 7 meters.

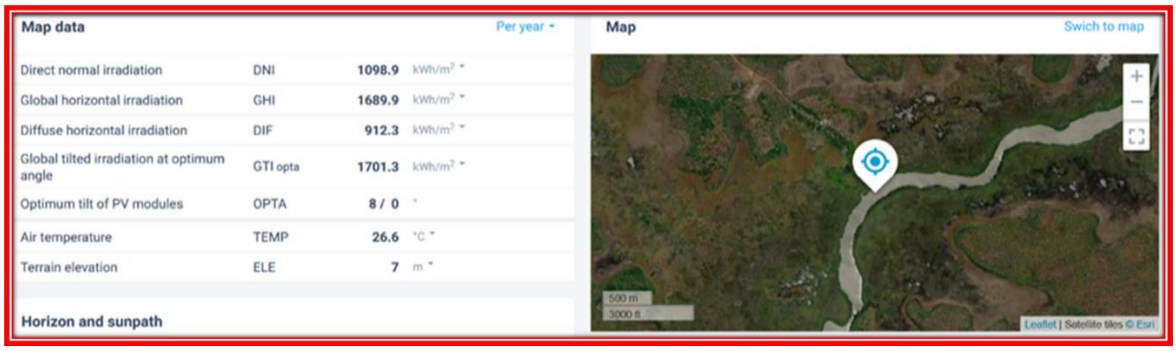

Fig. 5. Solargis Data Map results

DNI 3.011 kWh/m^2 per day, GHI 4.630 kWh/m^2 per day, DIF 2.499 kWh/m^2 per day, dan GTI 4.661 kWh/m^2 per day. OPTA 8/0, TEMP 26,6 ^{0}C and elevation 7 meters.

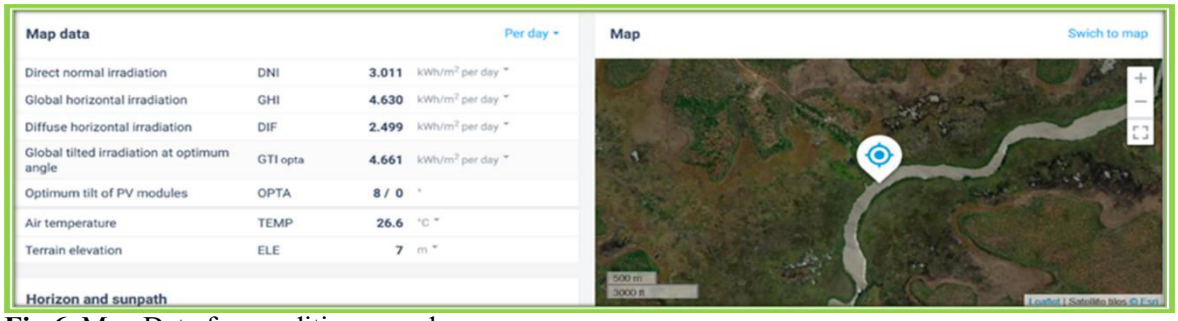

Fig.6. Map Data for conditions per day

The level of absorption of solar energy is at 10-11 o'clock, 12 o'clock and 13 o'clock in the afternoon with a solar azimuth of 0^0-30^0, the decrease in solar energy occurs at 7-9 o'clock and 14-17 WIT

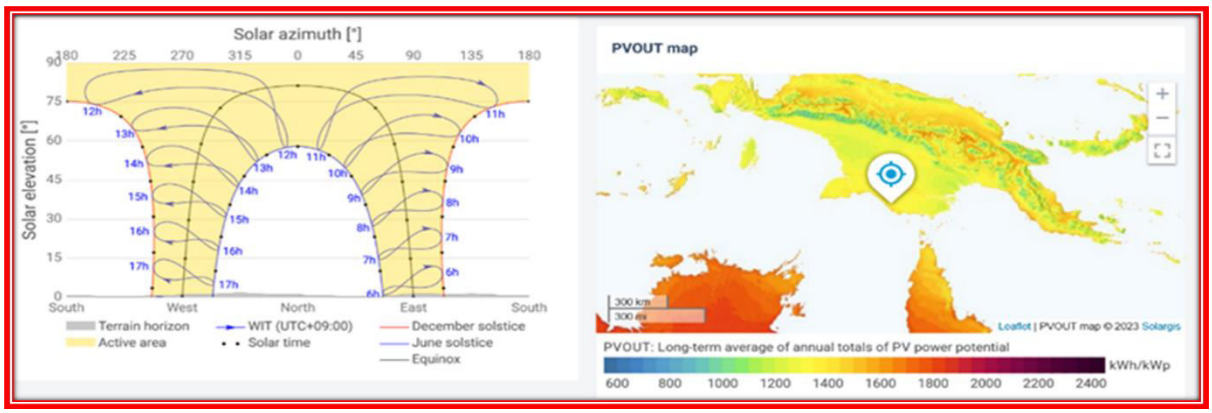

Fig. 7. Data solar azimuth dan PVout map

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Floating large scale for default 0^0, PV panel 10^0 to installed capacity 1000 kWp. Average hourly profiles, the lowest PV power output in June are 391,1 kWh and the highest in Oktober are 529,8

kWh.
Fig. 8. PV system configuration

The PV power output (MWh) graph for the lowest PVout is in June with 87.4 MWh and the highest is in October with a PVout of 121.7 MWh.

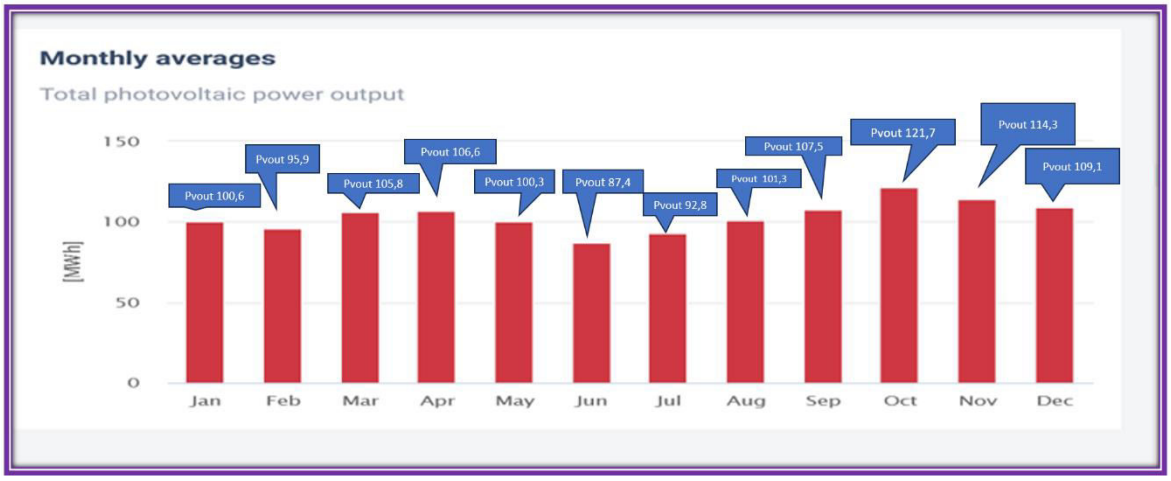

Fig. 9. Monthly averages (MWh)

4. Conclusion

Floating PV potential for the Rawa Biru area by taking an area of 95 ha = 53.25 MWp and a design model area of 8 ha = 2.14 MWp, while the Generating Potential for 95 ha is 79.93 GWh/year and 8 ha is 3.24 GWh/year. Solar energy data, DNI is 3,011 kWh/m2 per day, GHI is 4,630 kWh/m2 per day, DIF is 2,499 kWh/m2 per day, and GTI is 4,661 kWh/m2 per day. OPTA 8/0, TEMP 26.6 ^{0}C and elevation 7 meters. Floating PV panel 100 and temperature 26.6 ^{0}C, solar azimuth 0^0 coincides with 12.00 WIT.

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