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This article by Dr Iestyn Woolway, Reader and NERC Independent Research Fellow at the School of Ocean Sciences is published under a creative commons licence by The Conversation. Read the original article here.

New research has found that several countries could meet all their energy needs from solar panel systems floating on lakes. Climate, water and energy environmental scientists R. Iestyn Woolway and Alona Armstrong analysed how much energy could be produced by floating solar panels on just 10% of the water surface of one million bodies of water globally. They found that Ethiopia and Rwanda could generate more energy than their current national energy need from the floating energy systems alone.

Floating solar panel systems use pontoons or rafts to keep the solar panels afloat. These floating structures are anchored or tethered to the edges of the water bodies to ensure stability. The systems can be designed to withstand varying water levels and weather conditions, including storms.

About five million square kilometres of Earth"s surface area (or 3.7% of the Earth"s surface that isn"t covered with ice) is taken up by lakes and reservoirs. Solar panel systems could be floated on many of these surfaces.

Just like solar panels mounted on buildings or the ground, the floating systems convert sunlight into electricity using photovoltaic cells. The generated electricity is then transmitted to the grid or used locally. Being on water helps keep the floating solar panels cool, and they produce more electricity than land-based solar panels and may last longer.

Floating solar panel systems are used by countries that do not have a lot of land available but do have large and numerous water bodies. Ghana recently installed the largest floating solar panel system in Africa on one of its reservoirs.

We used a tool called the Global Solar Energy Estimator to help us calculate how much energy solar panels could generate in over 1 million water bodies around the world. We gathered data about sunlight and air temperature and specific details about the solar panels. Using satellite images of the water bodies, we worked out which parts of the water could be covered by solar panels.

We did not include water bodies that dry up, freeze over for more than six months a year, are situated within a protected area, and are more than 10km from a population centre. We also limited the size of the floating solar systems, taking potential technical and environmental constraints into account.

Our research found that Rwanda and Ethiopia could generate far more energy from these systems than they currently use. Rwanda could generate 237% of its current total energy needs, and Ethiopia 129%. Chad could generate 73% of its current energy need from floating solar systems alone. Mali, Madagascar, Malawi,

Uganda, the Democratic Republic of Congo and Togo could generate between 15% and 58% of their total energy demand from floating solar panels.

We also found that there are 1,977 water bodies across Africa that could be used to float solar panel systems. This would spare the land that would otherwise be needed for land-based solar panels.

Grid connectivity and infrastructure: Many regions in sub-Saharan Africa have limited or unreliable grid connections. The grids need to be improved if these countries are to make full use of the electricity generated by floating solar panel systems. If expanding the centralised grid is too expensive, off-grid solutions such as mini-grids near the water bodies need to be developed.

Regulatory and policy support: Governments will need to encourage the development of floating solar panel projects, including incentives, subsidies and streamlined permitting processes. They''ll also need to set up strict regulations, including environmental and safety standards.

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