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How Agrivoltaics Can Help Emerging Markets Meet Both Food *and* Energy Needs

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Agrivoltaics, using the same piece of land to produce solar energy and food, is expanding in emerging markets. It offers potential to use land more efficiently while increasing output and creating jobs. Diverse challenges—technical, financial, and regulatory—must be overcome for its wider deployment to advance, IFC research finds.

As pressures on land use mount in emerging markets, the energy and agriculture sectors are sometimes pitted against one another. With agrivoltaics, it does not have to be an either/or. The sectors can draw from the same resource in a mutually supporting way.

Detailed data on how widely agrovoltaics is being deployed remains scarce. A 2024 study[1] estimated that between 2.8 and 14 gigawatts of agrivoltaics capacity has been installed worldwide—a significant surge in growth over the past decade (see Figure 1). Economies[2] deploying agrivoltaics are diverse and include advanced, developing, and emerging (see Figure 2).

Farmers can generate income from agrivoltaics in two ways: using and selling the energy the solar panels generate and exploiting the shade the panels provide to grow certain kinds of crops or livestock that benefit from such protection. Crops can include foods rich in micronutrients like lettuce and berries. Livestock can include sheep and goats.

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In terms of solar panel design, farmers can choose from several templates. Broadly speaking, there are two options: to mount the panels over the crops (overhead configuration) or between them (interspaced configuration). However, there are many variations within these two configurations (see 2026 report[3] for more detailed explanations + photo illustrations for examples).

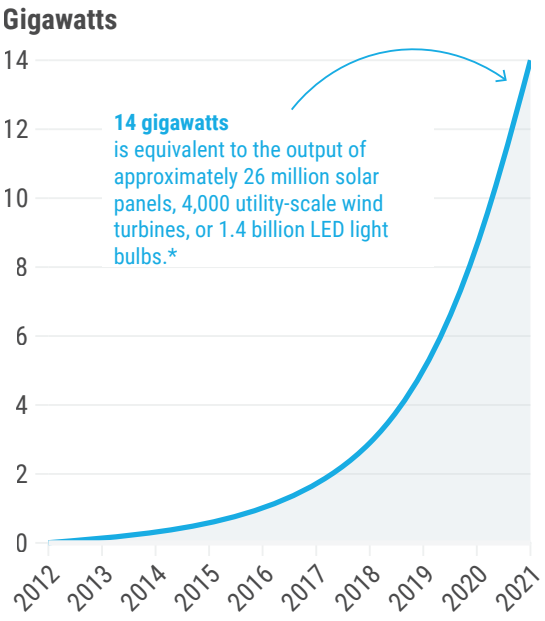
In choosing an optimal design, farmers have multiple and complex factors to consider that include what crops or livestock they have, what farm machinery they use, and how windy/hot/rainy/sunny it gets. Even market factors like how the price of electricity is calculated in their area should be weighed in the

Growing crops between solar panels. Photo © Malalasekara via Shutterstock

FIGURE 1

Agrivoltaics is booming

Installed agrivoltaic capacity worldwide



* According to the US Department of Energy

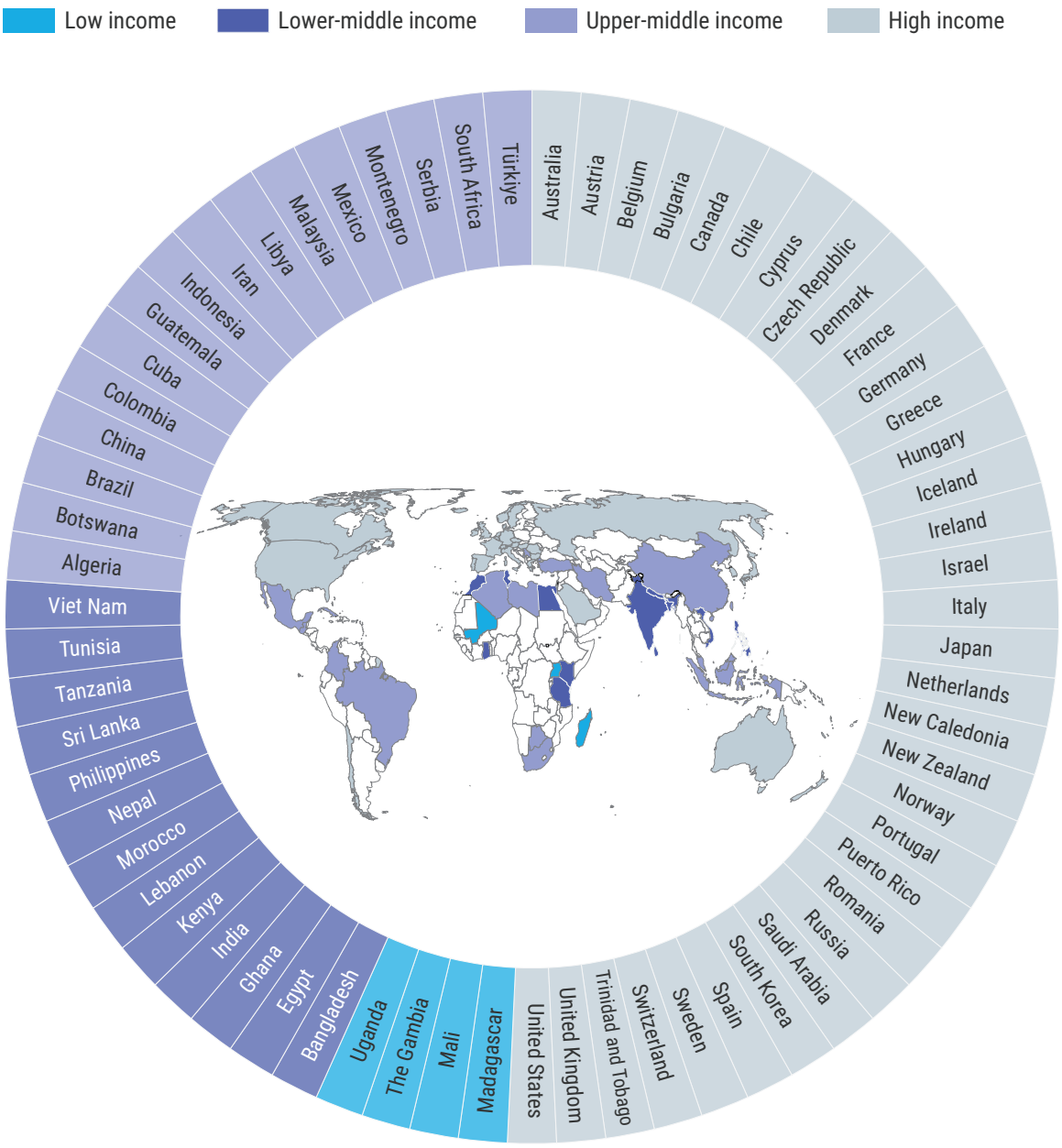
Source: Energy Monitor: The farmers profiting from the solar power boom • Data from Fraunhofer Society

Growing crops underneath solar panels. Photo © Jacopo Landi via Shutterstock

FIGURE 2

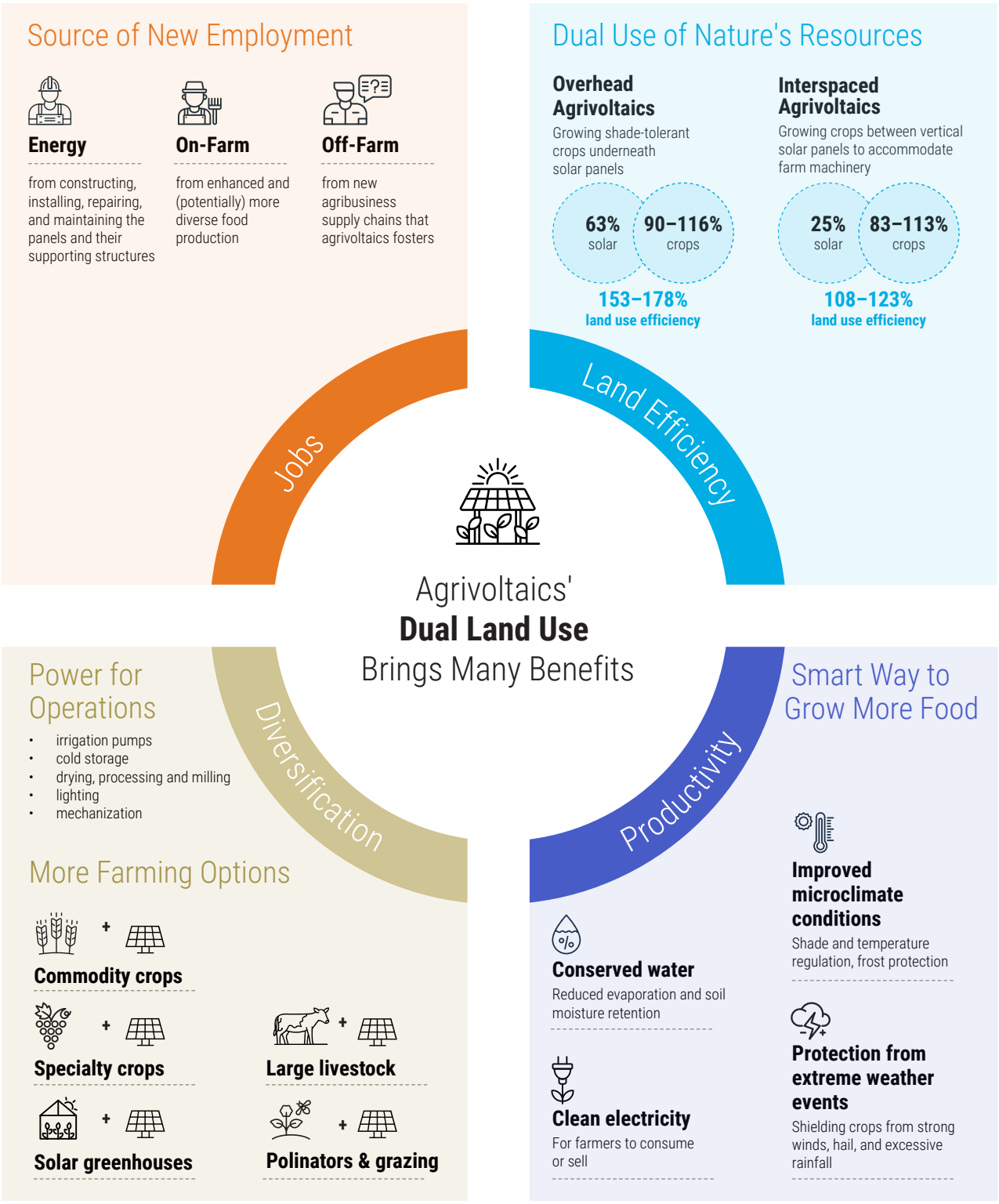
Agrivoltaic systems are found in all regions

Penetration by income groups*



* The figure shows countries with active agrivoltaic projects • **Source**: IFC PwC analysis

FIGURE 3



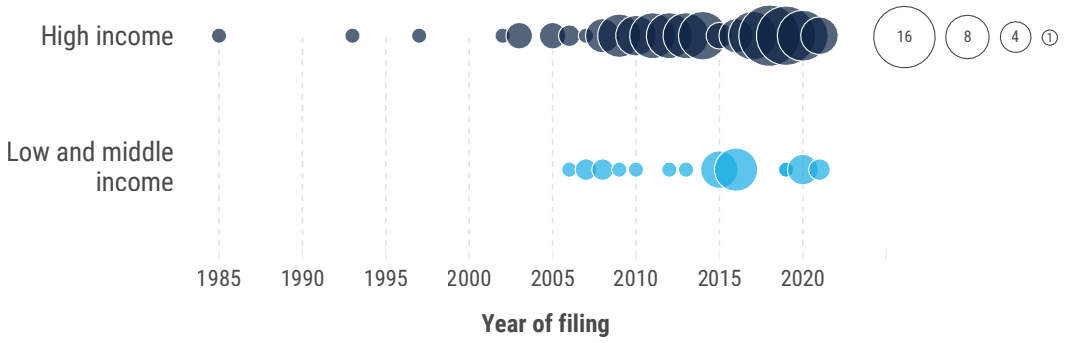
Source: Adapted from "Empowering farmers in Central Europe: the case for agri-PV", Ember, 2024 • "Agrivoltaics 101", National Renewable Energy Laboratory, 2024

design pick. The energy produced can be used by the farmer for various activities and appliances including irrigation pumps, refrigeration, drying, processing and milling, lighting, and mechanical tasks.[4] All these productive uses of energy create jobs: both on-farm (installing, repairing, and maintaining panels, for example) and off-farm from the new supply chains that emerge from deploying the technology.

FIGURE 4

Developing economies are filing more agrivoltaic patents

Patent count by income groups



Source: IFC Study, using data from the European Patent Office, 2023.

In addition, agrivoltaics can support the surrounding community by increasing access to electricity. That is because farmers can feed unused or excess energy into power grids. It can be difficult to connect farm-generated energy, but it also presents an opportunity for investment and innovation.

This technology creates jobs in multiple ways. Firstly, through on-the-farm jobs stemming from the added food production it supports. Secondly, jobs for neighboring communities in constructing, installing, maintaining, and repairing panels and their supporting structures. Thirdly, spinoff jobs across the agribusiness supply chain from increased food output such as packers, drivers, graders, and sales agents.[5]

With extreme weather events predicted to become more frequent and severe, agrivoltaics can also help farmers make their land more resilient to such stresses. Shading from solar panels can protect crops from excessive sunlight during heatwaves and reduce damage from torrential rains. One study found that it can reduce water needs by 14 to 29 percent,[6] a crucial saving at a time when scarcity of water becomes an ever more pressing issue.

That said, the equipment itself can be damaged by the weather too. For example, hail or wind storms can crack panels and cells, bend frames, or tear modules from mounting racks. While the damage risks are real, they can be mitigated through smart engineering practices like designing thicker glass, reinforced racking and foundations, and tilting panels to certain angles.

Sheep grazing beside solar panels. Photo © thka via Shutterstock

IFC's research[7] finds that while developing countries are not yet leading in share of acreage deploying agrivoltaics, there is interest and innovation. This is highlighted by a global review of data on filed patents that showed increasing adoption in emerging economies in multiple regions including Argentina, Egypt, India, South Africa, and Viet Nam (see Figure 4).

As promising as this technology is, there are significant barriers to wider deployment that sustained effort from public and private players can help overcome. For example, public authorities can adopt clear regulations that explicitly support dual land use for agriculture and energy. Financial institutions—including commercial and multilateral development banks—can channel more capital to farmers wanting to deploy the technology, especially smaller ones, as initial installation costs are substantial.[8] The World Bank launched a major initiative in 2025, AgriConnect, that seeks to ramp up such support, specifically targeting smallholders to help connect them better to global supply chains.

To ensure that neighboring communities benefit too, farmers require support and partnership to connect the power they generate to the grid. They can also use training and technical support to help them choose a panel design model that best meets their needs.

Considerations here include panel height, spacing between panels, and angle of tilt, all of which need to be tailored to the crop or livestock as well as the local climate.

While the challenges are real, so too is the opportunity for investment. With agrivoltaics creating so many on- and off-farm jobs, tapping this potential can be a smart—and potentially profitable—path to take ■

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