DORAL LLC

Dual Use Projects (Agrivoltaics)

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Dual Use of the Land with Agrivoltaics

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We farm the Land and Harvest the Sun.

The U.S. Department of Agriculture (USDA) defines **agrivoltaics** as the **co-location of solar energy installations with agricultural production on the same land**. This integration allows for the simultaneous use of land for both solar photovoltaic (PV) energy generation and agricultural activities, such as crop cultivation, livestock grazing, or pollinator habitats.

According to the USDA, there are three main types of agrivoltaic systems:

- Crop production under solar panels.
- Cultivation of pollinator-friendly plants on solar sites: This type focuses on creating habitats for pollinators such as bees and butterflies beneath or around solar panels.
- Livestock grazing on solar sites: This system allows animals, primarily sheep, to graze among solar panels

Additionally, the USDA recognizes variations within these types:

- Solar arrays on tall rack mounts with crops planted underneath
- Rows of solar arrays with crops planted in between
- Greenhouses with solar arrays on their roofs

The most common form of agrivoltaics in the United States involves sheep grazing and/or pollinator habitats.

The Challenge

Significant potential rewards are possible when you decide in advance what you can afford to lose and take a risk where the cost of failing is low. (The Affordable Loss Principle, "Little Bets" from Peter Sims)

Do nothing (typical approach)
- Vegetation and weeds will grow forever.
- Mowing will be needed for the project's life.
- Money (lots of) will be spent in vegetation management for the project's life.

Challenges
- Project's design and size.
- Cost efficiency
- Insurance and bankability.
- GCR/energy yields.
- Accessibility.
- Safety and Risk Management.

Potential outcomes
- Better, dual use of land.
- Benefits to the local community.
- Soil health improvements.
- Food production.
- CO_2 capture
- **Additional income and/or Vegetation management savings.**

Enough budget for Experimental Innovation

Doral's Dual Use of the Land with Agrivoltaics

Repurposing existing farmland for solar energy production and Agriculture

Adaptive agriculture maximizing solar energy production with industry standard designs.

Agrivoltaics

- Clean Agriculture
- No stressed yields
- No tillage
- No pesticides
- No herbicides
- No ECONOMIC Stress for yield competition

- Specialty high value crops
- Niche markets
- Healthy food
- Locally sourced, Finalized products

- Protection of existing farmland (no industrial or urban development for years to come)
- Increased bio-diversity (Pollinators, Bees and Birds)
- Promotion of regenerative agriculture (Regenerating Families, Regenerating Communities, Regenerating soil and natural resources)

Agrivoltaic at Scale and Farmland Availability

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Repurposing farmland, improving efficiencies and soil recovery

(1) Credit to Visualcapitalist.com: https://www.visualcapitalist.com/visualizing-the-uses-of-corn/

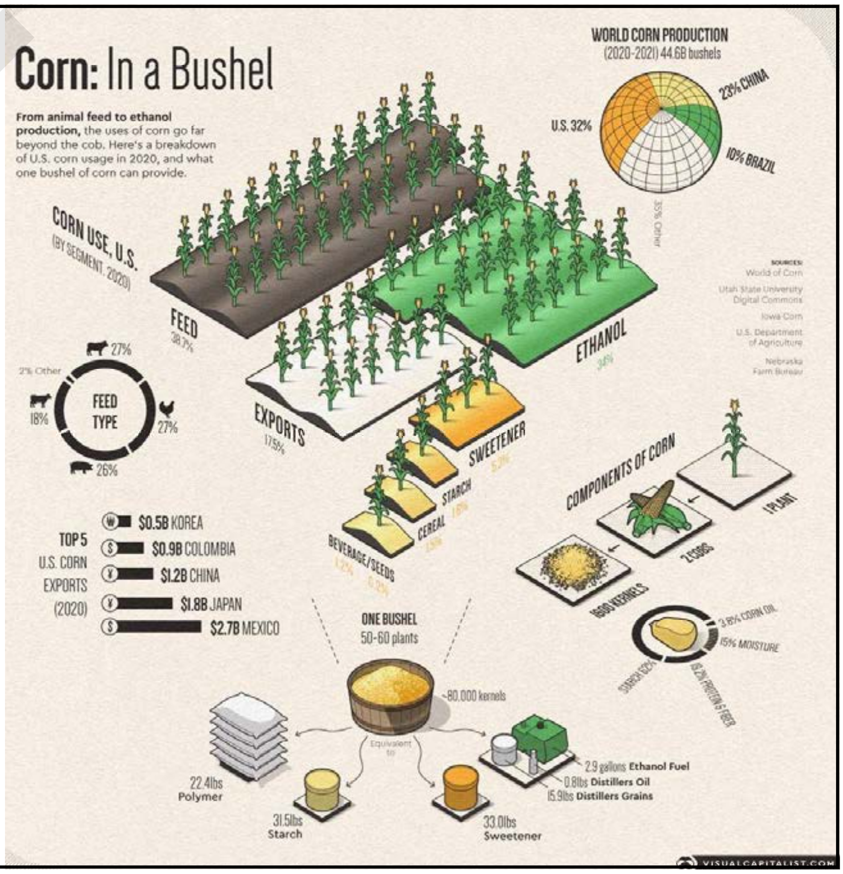
Corn and Energy Facts

Let's try compare apples to apples -in terms of energy- assuming our 400MW Solar Project substitutes 2,125 acres of corn for ethanol with Agrivoltaics:

- One (1) bushel of corn produces approximately **2.8 gallons of ethanol**.[1]
- One (1) Gallon of Ethanol equals **0.67 gallons of Gasoline.**[2]
- Average Car fuel consumption: **24.20 Miles per Gallon**.[3]
- Electric Vehicle's mileage per KWh: **3 miles per KWh.**[4]

"88% of the energy generated by solar PV goes to society, while 12% is offset by production requirements.
In contrast, 20% of the energy generated by corn ethanol goes to society, while 80% is offset by production requirements." [5]

(1) Iowa Renewable Fuels Association: https://iowarfa.org/ethanol-center/ethanol-co-products/distillers-grains-facts/
(2) DOE's Alternative's Fuel Data Center: https://afdc.energy.gov/fuels/properties
(3) DOE's Alternative's Fuel Data Center: https://afdc.energy.gov/data
(4) DOE: https://www.energy.gov/energysaver/cost-charge-electric-vehicle-explained
(5) Clean Wisconsin analysis corn versus ethanol: https://www.cleanwisconsin.org/wp-content/uploads/2023/02/Corn-Ethanol-Vs.-Solar-Analysis-V3-12-compressed.pdf
(6) Making Ethanol From Corn Is The Least Efficient Use Of Farmland by Bill Nussey: https://www.freeingenergy.com/replace-farmland-farm-corn-ethanol-solar-panels/
(7) USDA: Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water)



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