

CLACKAMAS COUNTY BOARD OF COUNTY COMMISSIONERS

Policy Session Worksheet

Presentation Date: April 20, 2021 **Approx. Start Time:** 1:00pm **Approx. Length:** 30 minutes

Presentation Title: Agrivoltaics Innovation at the North Willamette Research and Extension Center (NWREC)

Department: OSU North Willamette Research and Extension Center

Presenters: Mike Bondi, Chad Higgins, Dan Orzech; OSU North Willamette Research and Extension Center

Other Invitees: Sarah Eckman, BCS Interim Director; Cheryl Bell, DTD Assistant Director; Eben Polk, Sustainability Supervisor; Jeff Jorgensen, Facilities Division Director

WHAT ACTION ARE YOU REQUESTING FROM THE BOARD?

This is an informational session for the OSU North Willamette Research and Extension Center (NWREC) to share about their agrivoltaics project, offering the Board the opportunity to learn about and support this innovative work.

EXECUTIVE SUMMARY:

The NWREC is Oregon State University's only agriculture field research station located in the northwestern part of the state. They serve farmers in the seven county north valley area and focus research and education on the region's most important crop systems: nurseries and greenhouses, fresh vegetables and specialty seed crops, berries and small fruit, Christmas trees, Orchard Crops, Field Crops, and Small Farms. In addition, NWREC is the location for the state's only IR-4 Pesticide Registration program working with many of the state's agricultural crops throughout Oregon.

NWREC will break ground on a new agrivoltaics research project this year that will study opportunities in, and effects of, growing crops ("agri") and producing solar energy ("voltaics") on the same land—something not typically done now. The NWREC installation will become the first energy/farm research study area of its kind in the world.

NWREC is engaging with the Board to gain their support in order to promote the agrivoltaics research initiative at NWREC, and also to share with the Board that County special districts may be able to participate as subscribers of the power produced at NWREC's Regenerative Agriculture Center.

The concept of "agrivoltaics" combines commercial agriculture and energy production on the same land—and, to the detriment of neither. The new Regenerative Agriculture Center at NWREC will be the first agricultural research area to examine the interrelationship between plant growth and performance in, under, and around solar panels. Oregon State University has

recently produced a short video about agrivoltaics. The video can be viewed at <https://youtu.be/ZP7kuQS6Qil>

A better understanding of the opportunities for solar arrays and agriculture to co-exist and potentially even benefit each other, has the potential to offer new solutions that promote agriculture and reduce our greenhouse gas pollution. This is helpful for communities like Clackamas County where agriculture is important, because an increase in climatic extremes can be disruptive and costly for agriculture, and because solar arrays can diversify income sources. Unlike commonly-seen conventional solar arrays, these panels will be spaced to allow farming both between and under the panels. Pacific Northwest commercially grown agricultural crops will be studied in this work.

Financing for the infrastructure and installation of the project is being provided by the Oregon Clean Power Cooperative and the power generated from the panels can be purchased by any individual, business, or organization. More specifically, the opportunity to purchase power from this project is available to agencies the Board oversees. In addition to the County's commitment to become carbon neutral over time, the County's Energy Policy (adopted in 2016) calls for targets for renewable energy use. In the last year, with Board approval, the Sustainability & Solid Waste program worked with Facilities to procure clean and affordable solar electricity for the County's core operations (not generally including special districts) through other local community solar projects in the County. Opportunities may remain, however, for the County's special districts to procure clean affordable electricity through NWREC's agrivoltaics or similar projects.

FINANCIAL IMPLICATIONS (current year and ongoing):

Is this item in your current budget? YES NO

What is the cost? \$ 2,000,000

What is the funding source? This is not a County funded project. NWREC is using Oregon Clean Power Cooperative, OSU College of Agricultural Sciences, plus grants and contracts to fund the research.

STRATEGIC PLAN ALIGNMENT:

- **How does this item align with your Department's Strategic Business Plan goals?**
 - Improve the productivity of commercial agricultural crops in the region
 - Increase the profitability of farming in the region
 - Improve environmental practices related to commercial agriculture

- **How does this item align with the County's Performance Clackamas goals?**
 - Growing a vibrant economy relates to increasing the profitability of farms.
 - The Regenerative Agriculture Center will add significant infrastructure in the County when adopted that will produce energy at minimal cost.
 - Safe, healthy, and secure communities are ones with ample and low-cost energy.
 - We are investing in one of Clackamas County's most important natural resources—agriculture.
 - This project showcases a collaboration between the university, a cooperative, and the community. And, there is room for the County to participate, too!

LEGAL/POLICY REQUIREMENTS: N/A

PUBLIC/GOVERNMENTAL PARTICIPATION: N/A

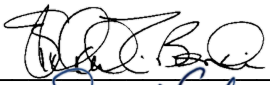

OPTIONS: N/A – This Policy Session is informational only.

Recommendations: N/A – This Policy Session is informational only.

ATTACHMENTS:

1. PowerPoint: Regenerative Agriculture Research at the North Willamette Research and Extension Center
2. January 8, 2021 News Release: Agrivoltaics – next big initiative at NWREC
3. AGV Links

SUBMITTED BY:

Division Director/Head Approval  Michael C. Bondi, NWREC--Director
Department Director/Head Approval  BCS Interim Director
County Administrator Approval _____

For information on this issue or copies of attachments, please contact Mike Bondi at 971-801-0384

Regenerative Agriculture Research at the North Willamette Research and Extension Center

Community Solar / Agrivoltaics Research Project



College of Agricultural Sciences

Prof. Chad Higgins
Assoc. Professor
Biological and Ecological Engineering

Michael Bondi
Director, North Willamette Research
and Extension Center

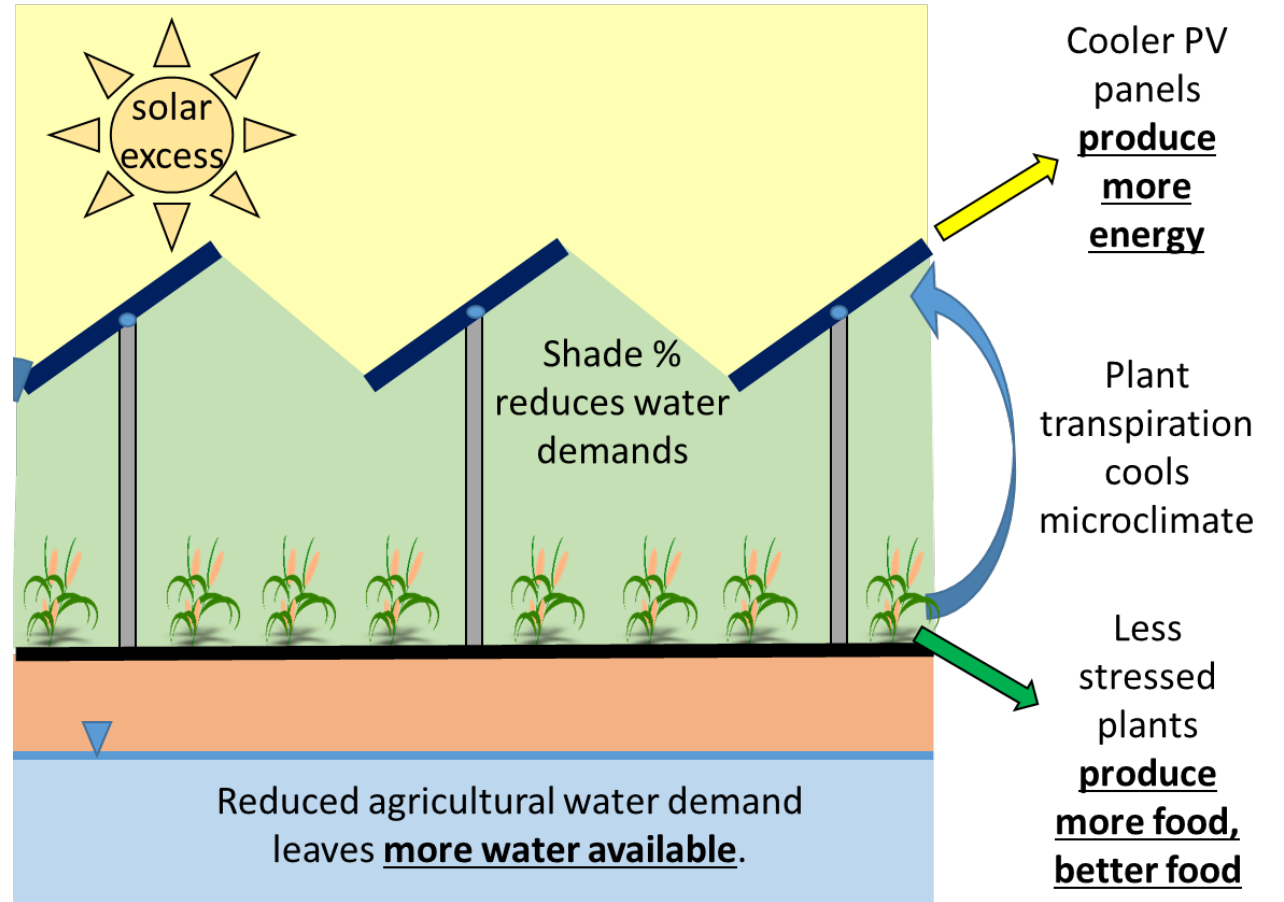


Dan Orzech
General Manager

DUAL-USE, AGRIVOLTAIC SYSTEM



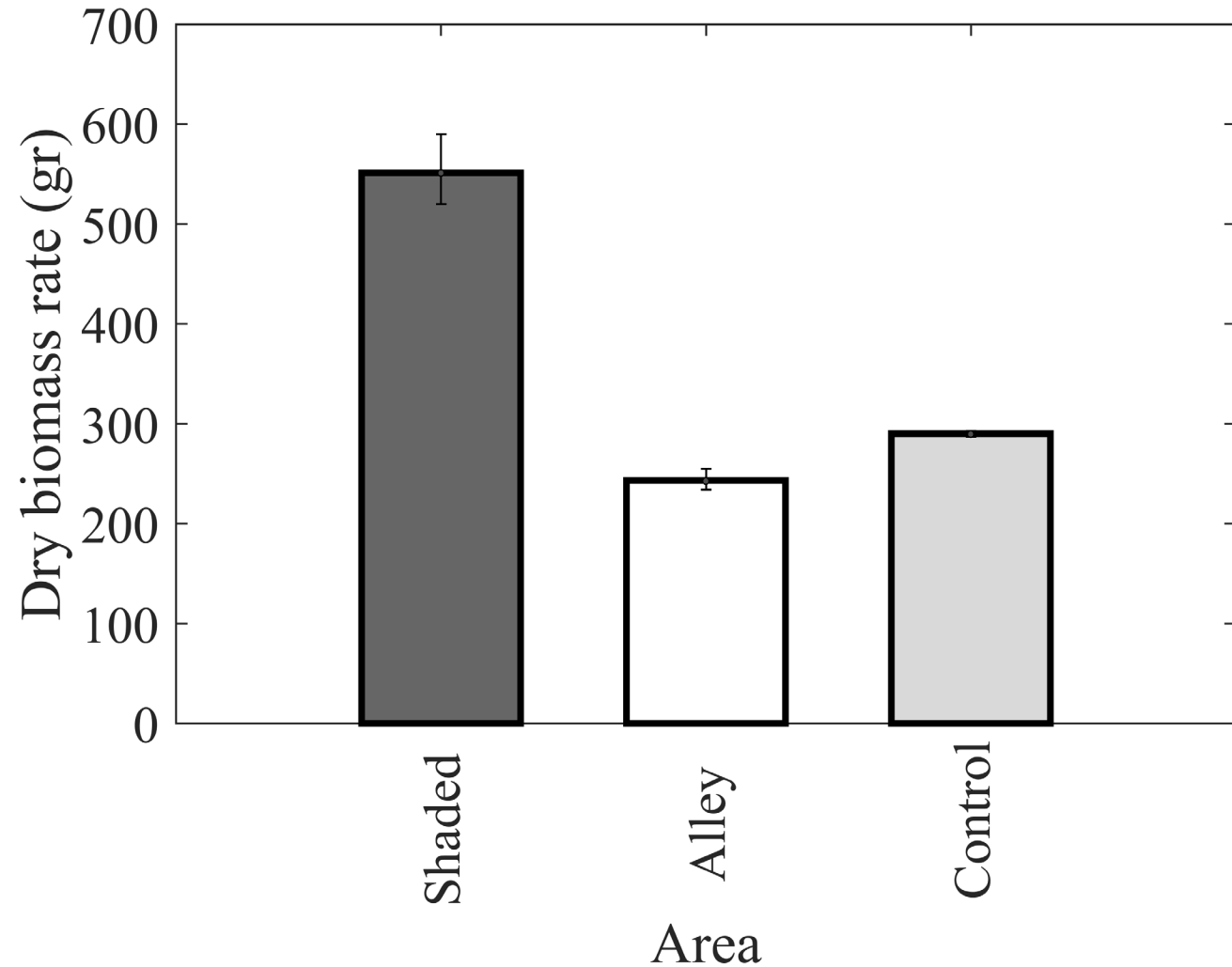
Sketch of system mutual benefits



**BIOMASS
PRODUCTION
ROUGHLY
DOUBLED**

**PLANT
WATER-USE
EFFICIENCY
TRIPLED**

Hassanpour E**, Selker JS, Higgins CW,
'Remarkable solar panel influence on soil moisture,
micrometeorology and water use efficiency.' *Plos1*,
2018,



Pollinators:

More in aisle area;
Changes in timing



Livestock:

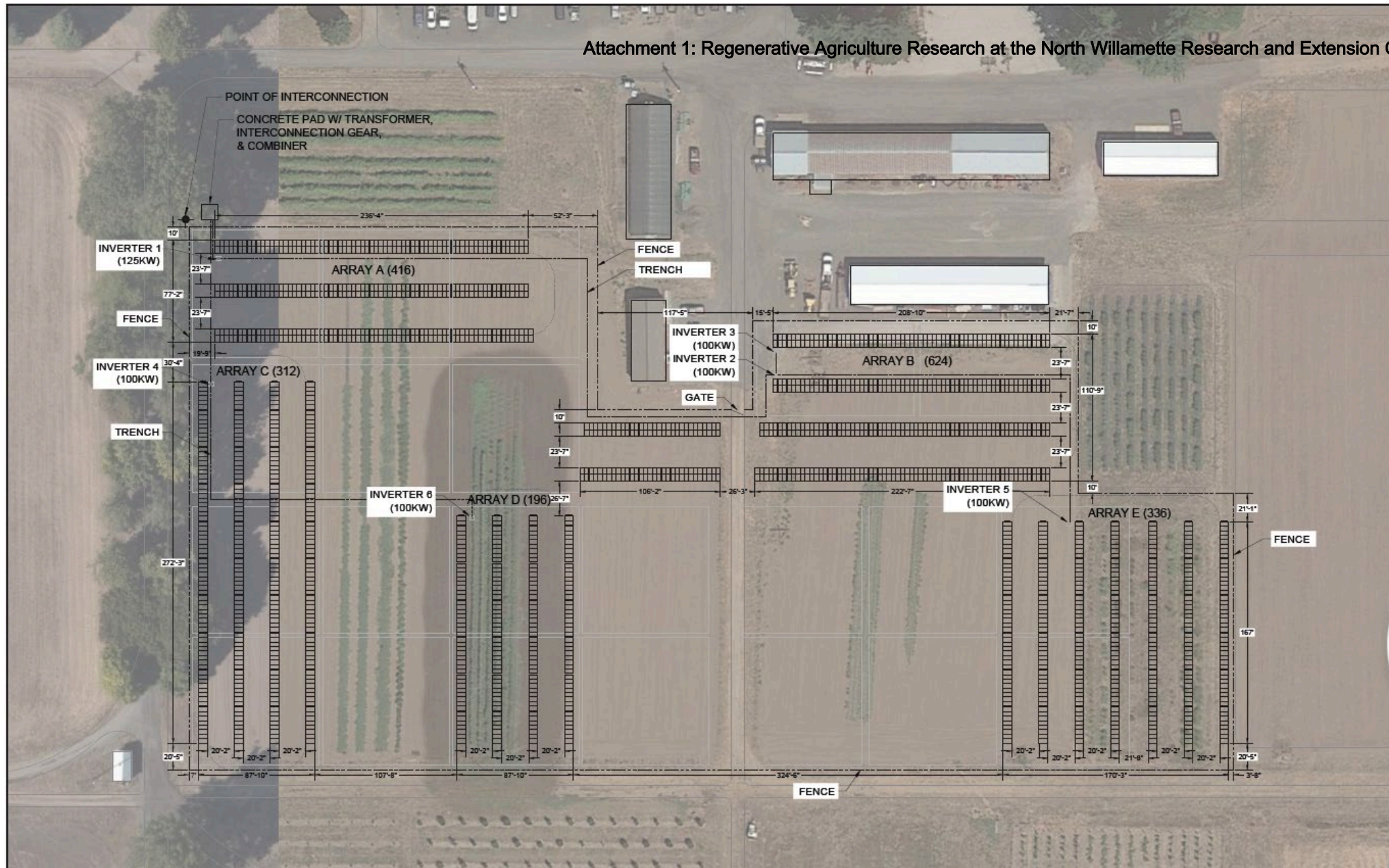
Preference for areas under panels;
No reduction in live weight gains



Major Global and National Impacts

- ~1% of cropland would offset the global energy demand if converted to agrivoltaics.
- ~1% of US cropland would reach the nation's sustainable energy targets, costing ~1% of the annual budget.
- Re-purpose excess energy to make agriculture more sustainable.





ARRAY SPECIFICATIONS

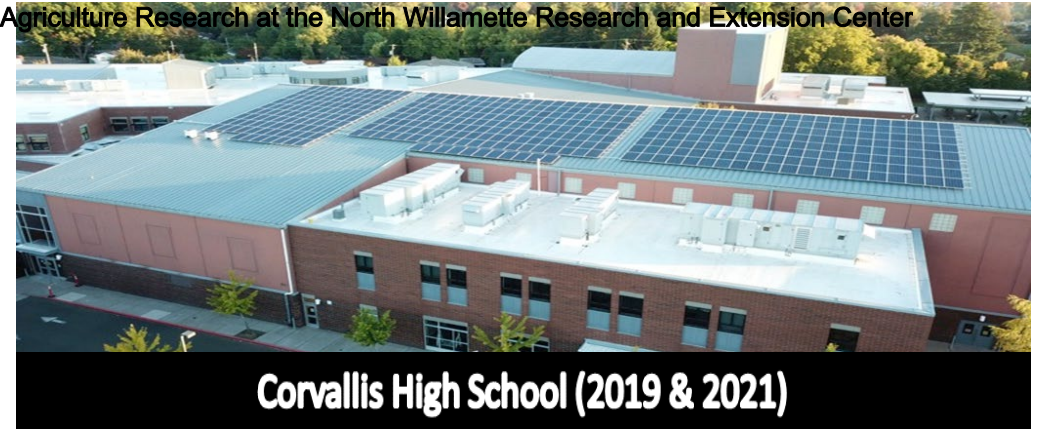
- (1,884) CANADIAN SOLAR 400W PV MODULES
- (1) CPS 125KW INVERTERS
- (5) CPS 100KW INVERTERS

ARRAY A & B: FIXED 20° TILT, 180° AZIMUTH
 ARRAY C, D, & E: SINGLE AXIS TILT VARIABLE

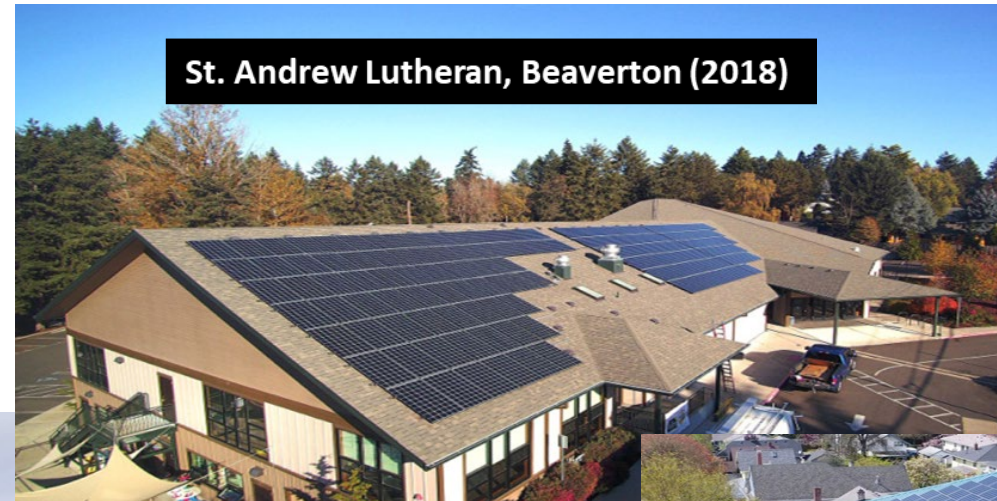
Solar Harvest
753 kW Solar Project



Attachment 1: Regenerative Agriculture Research at the North Willamette Research and Extension Center



Corvallis High School (2019 & 2021)



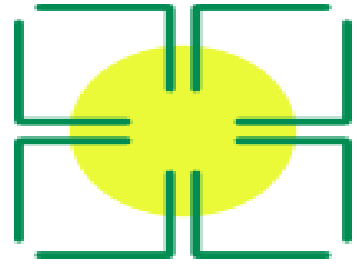
St. Andrew Lutheran, Beaverton (2018)



City of Hood River (2019)



Mazama Mountaineering Center
Portland (2017)



OREGON COMMUNITY SOLAR PROGRAM

The Oregon Community Solar Program

Now anyone can get the benefits of solar power—whether you own or rent. With the Oregon Community Solar Program, individuals and organizations come together to create an easy way for customers of Portland General Electric, Pacific Power and Idaho Power to get the advantages of solar.

How Does Community Solar Work?

- 1) Sign up – Subscribe to the power generated by a community solar project
- 2) Electricity produced by the solar project goes to the utility grid
- 3) Subscribers receive a credit on their utility bill for electricity produced by the project
- 4) Subscribers also pay fees through the utility to the program and solar project.

Estimated cost savings: 5%



Oregon State
University

**North Willamette Research
and Extension Center**

Oregon State University
15210 NE Miley Road
Aurora, Oregon, 97002

P 503-678-1264
oregonstate.edu/dept/nwrec

NEWS RELEASE—for immediate distribution

January 8, 2021

Contact: Mike Bondi, NWREC Director

503-678-1264 (X-67822) or michael.bondi@oregonstate.edu

Agrivoltaics—next big initiative at NWREC

Michael Bondi, Director—North Willamette Research and Extension Center

The North Willamette Research and Extension Center (NWREC) will break ground on a new agrivoltaics research project this spring that will study how to combine growing crops (“agri”) and producing solar energy (“voltaics”) on the same land—something not typically done now. The NWREC installation will become the first energy/farm research study area of its kind in the world.

“We see plenty of solar panels being set up on areas that can take good farm land out of production for crops,” said Chad Higgins, an Associate Professor at Oregon State University and leader of the project. Higgins has been developing data and information suggesting that growing some kinds of crops—vegetables, grain, and nursery plants—could actually be benefitted by the partial shade provided by overhead solar panels. “But, to create a commercial agriculture application for Oregon, we are going to need different designs and figure out just which crops make most sense to grow in this system.”

NWREC established their first solar energy array in 2014 when one acre of the Research Center was dedicated to energy production. The energy produced by NWREC’s array, and seen along Miley Road, generates about 200 kilowatts of power annually—depending on the weather—and currently provides about 80% of the Center’s electrical needs.

“Our array works well,” said Mike Bondi, NWREC Director. “But, we did lose one acre of very productive land at the Center when we decided to generate electricity. Chad’s concept will experiment with solar panels oriented north/south—instead of east/west, as typically done—raise the panels up and higher off the ground so we can run equipment and farm underneath them, and spread the panel arrays farther apart—again, for the equipment needs. We think this is an exciting concept!” In addition, new semi-translucent panels and other technologies will be evaluated for performance when growing crops.

The future of farming will be more and more influenced by most efficiently using energy resources, water, and maximizing the potential of the land. Generating energy from farm land, while still growing important crops for their markets, could be a very attractive opportunity for local farmers. Excess power from the new agrivoltaics NWREC array will be available in the electrical grid.

See NWREC’s website for a video link about agrivoltaics and this new potential application for farmers in the region at <https://extension.oregonstate.edu/nwrec>.

AGV Links—media

OSU: Combining solar, ag could ease climate change, help rural communities (January, 2021)

<https://ktvz.com/news/business/2021/01/05/osu-combining-solar-ag-could-ease-climate-change-help-rural-communities>

Could agrivoltaics feed our demand for clean energy? (January, 2021)

<https://pv-magazine-usa.com/2021/01/06/could-agrivoltaics-feed-our-demand-for-clean-energy/>

OSU's Sustainable Farm Project (February, 2021)

<https://extension.oregonstate.edu/nwrec/agrivoltaic-project>

Introduction to Oregon Ag Experiment and NWREC (October, 2020)

<https://extension.oregonstate.edu/nwrec>