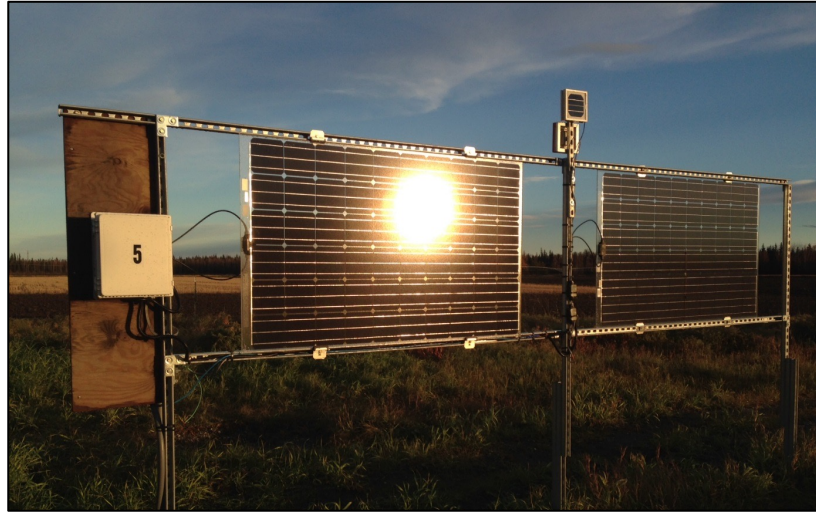


Bifacial Solar PV in the North



Chris Pike

Alaska Center for Energy and Power

22 April 2021

ACEP Solar Program Research Goals

- The ACEP **Solar Technologies Program** works to support responsible and equitable development of solar photovoltaic (PV) technology in Alaska and other cold regions and high latitude areas where it is technically and economically warranted.
- Give stakeholders tools to make decisions related to solar in Alaska and beyond
 - Maximize production
 - Minimize levelized cost
 - Improve integration strategies

Article

Field Performance of South-Facing and East-West Facing Bifacial Modules in the Arctic

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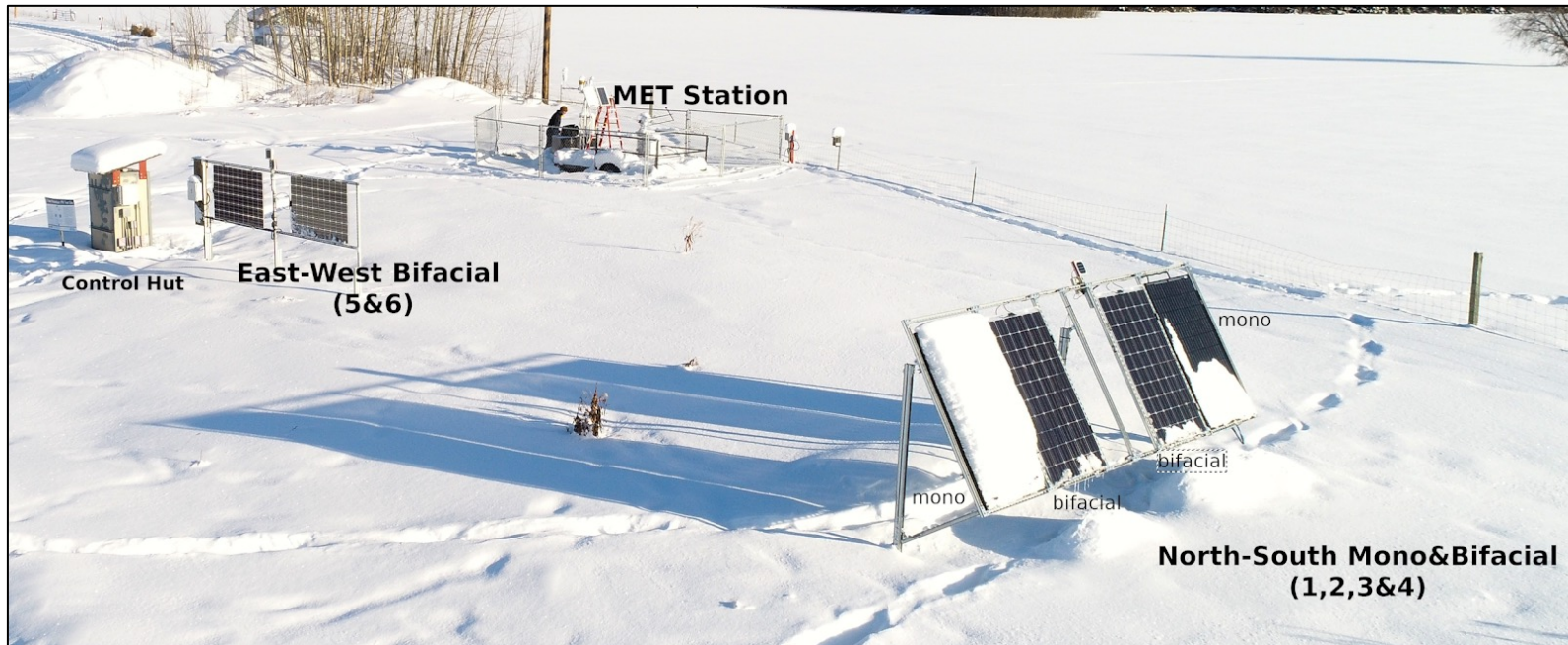
* Correspondence: cpik@alaska.edu

Abstract: This paper presents the first systematic comparison between south-facing monofacial and bifacial photovoltaic (PV) modules, as well as between south-facing bifacial and vertical east-west facing bifacial PV modules in Alaska. The state's solar industry, driven by the high price of energy and dropping equipment costs, is quickly growing. The challenges posed by extreme sun angles in Alaska's northern regions also present opportunities for unique system designs. Annual bifacial gains of 21% were observed between side by side south-facing monofacial and bifacial modules. Vertical east-west bifacial modules had virtually the same annual production as south-facing latitude tilt bifacial modules, but with different energy production profiles.

Pike, C., Whitney, E., Wilber, M., Stein, J.S.
Field Performance of South-Facing and East-West Facing Bifacial Modules in the Arctic.
MDPI Energies, 14, 1210 (2021).

<https://www.mdpi.com/1996-1073/14/4/1210>

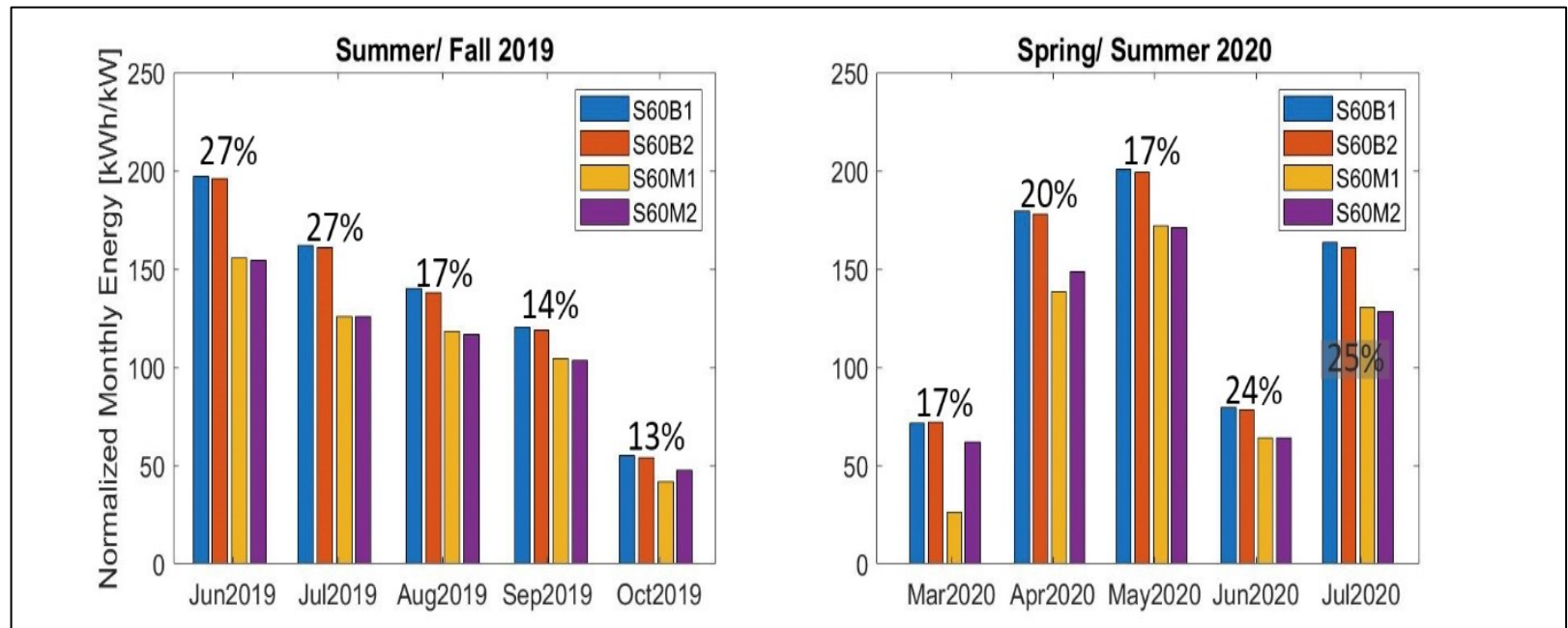
UAF Bifacial Test Site



- Bifacial Costs are near or at monofacial cost
- Currently account for about 20% of world market and that could rise to 70% by 2030ⁱ
- Bifacial modules have special potential in high latitudes

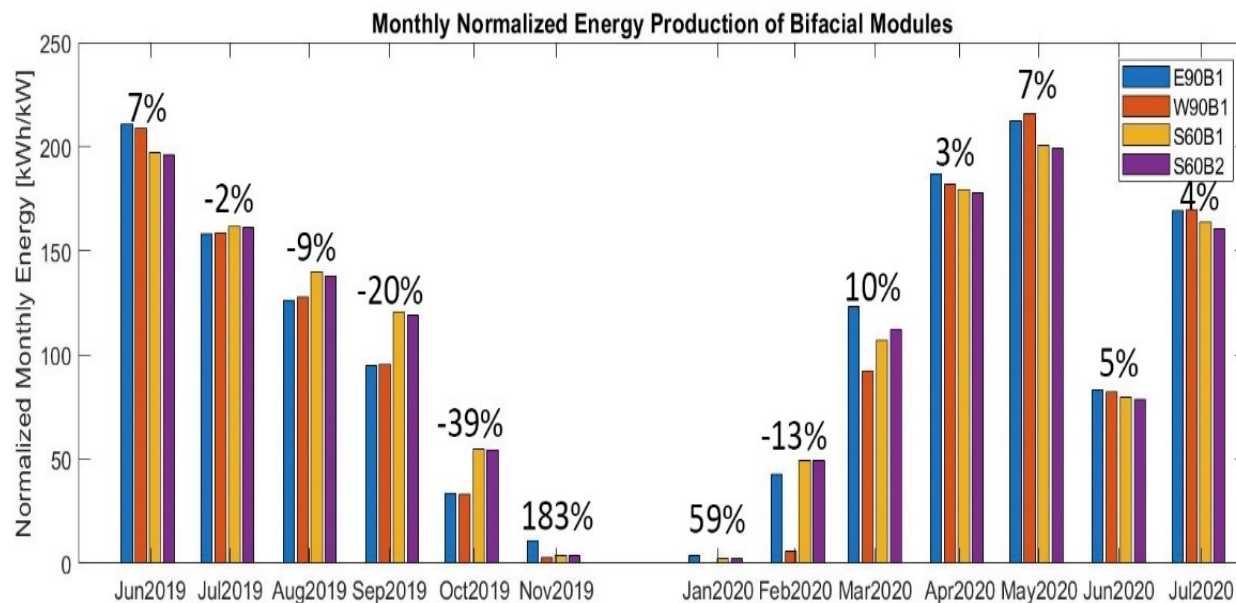
i. International Technology Roadmap for Photovoltaic (ITRPV)—Results 2019. Available online: <http://itrpv.vdma.org/>

South Facing Monofacial Versus Bifacial



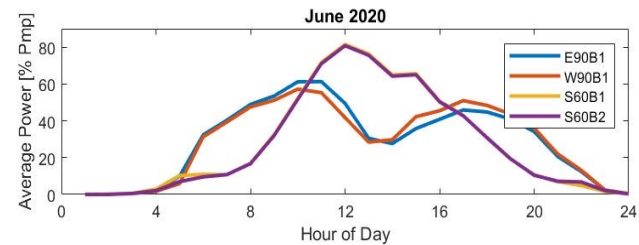
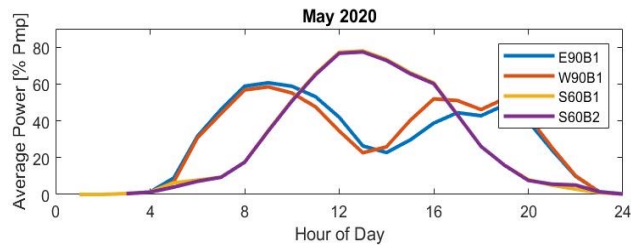
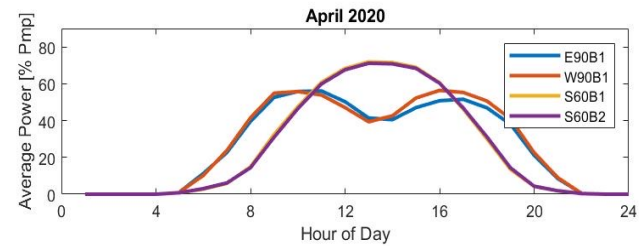
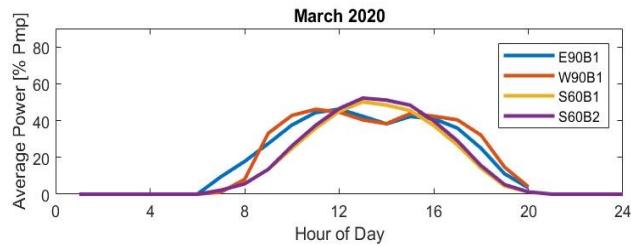
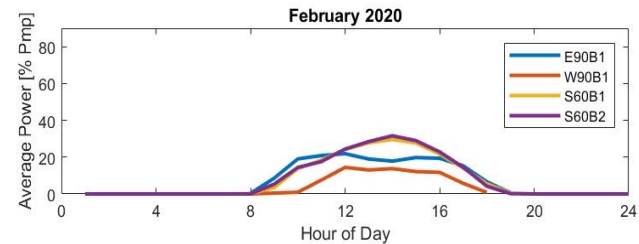
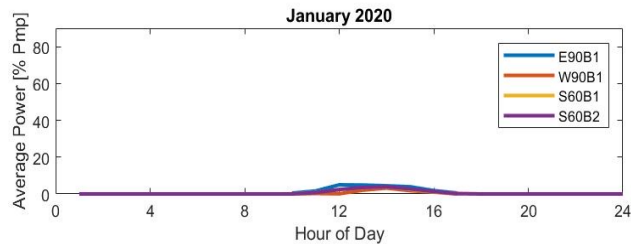
Annual bifacial gain of 21% observed

South Facing Bifacial Versus East-West Vertical Bifacial



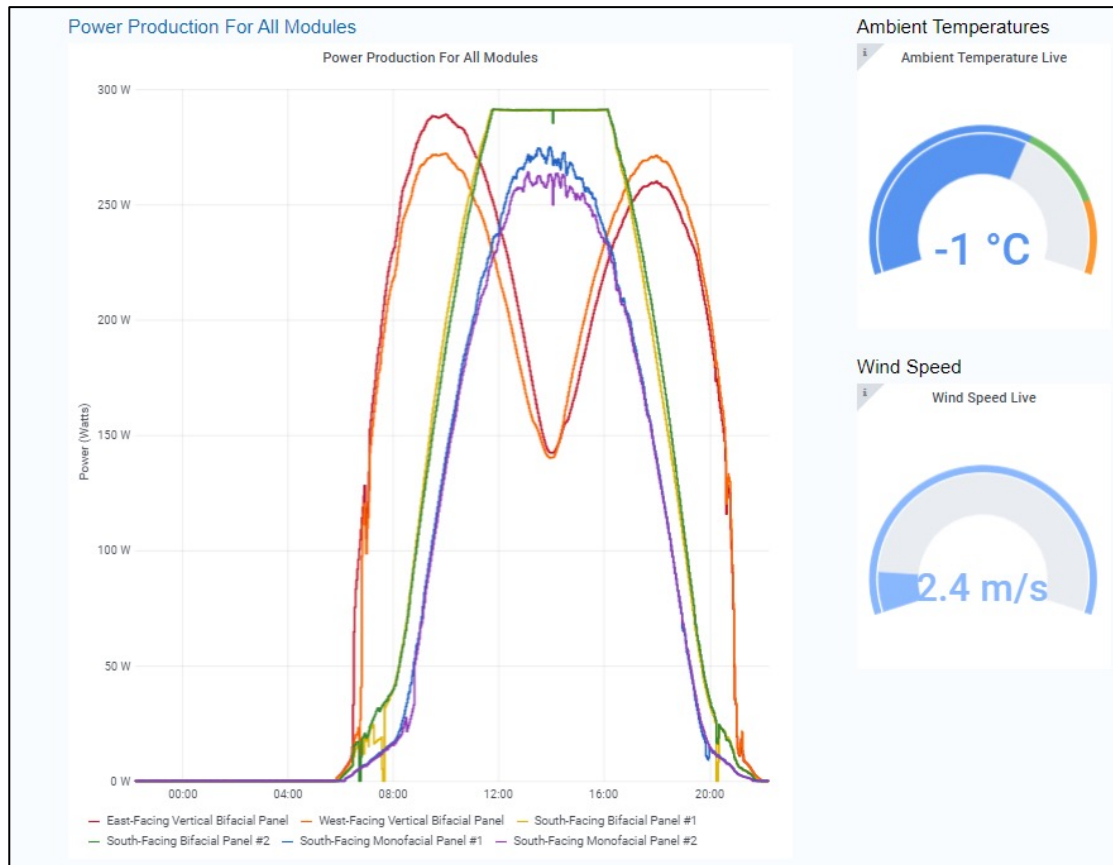
Annual energy production was nearly the same between the two orientations

South Facing and East-West Facing Production Curves



Future Research

- Bifacial model validation in northern environments with larger systems
- Ground coverage ratio and effect on south facing and vertical bifacial
- Racking options for bifacial



Thank You!

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