

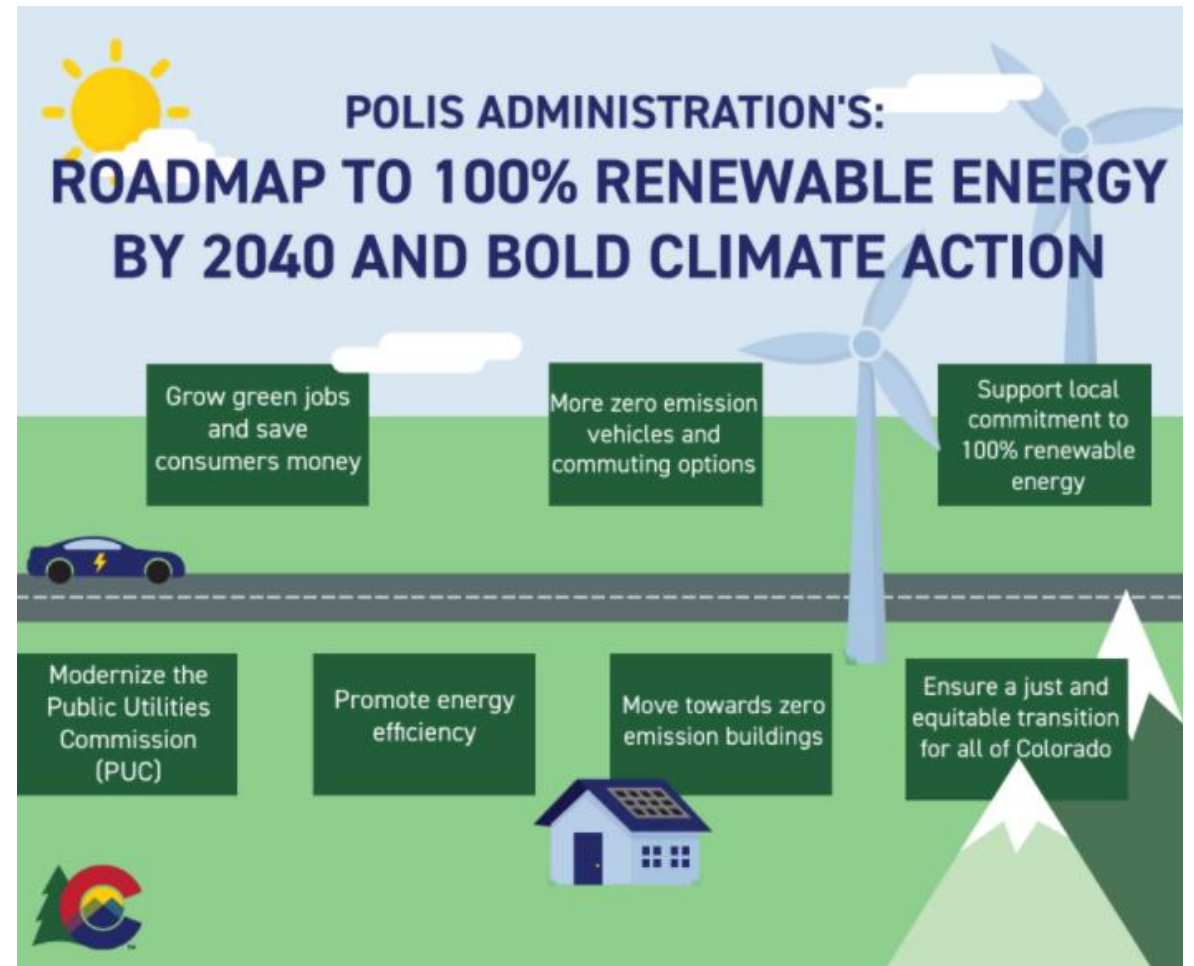


# Yampa Valley Sustainability Council: Solar Workshop

November 18, 2021

# Benefits of Renewable Energy

- ✓ Reduce energy, GHG emissions, and utility costs
- ✓ Progress State of Colorado goal of 100% Renewable Energy by 2040
- ✓ Resiliency and risk mitigation
- ✓ Drive community involvement
- ✓ Diversify and enhance local economy through green jobs



# Determine Your Solar Project Goals

- Community visibility
- Protection of vehicles
- Financial payback
- Emission reduction goals
- Progress Sustainability & GHG Reduction Goals
- Improve resiliency & reliability
- Reduce utility and operational costs
- Be a leader in solar development in the community

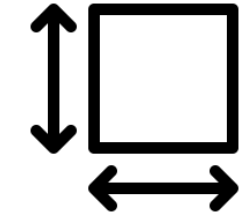


# Conduct an Initial Assessment

**Feasibility Assessment as Front End of Development Process – time to bring on a partner!**

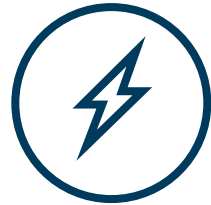


# Conduct an Initial Assessment



## Capacity

What can your site(s) physically accommodate



## Production

How much energy will systems produce



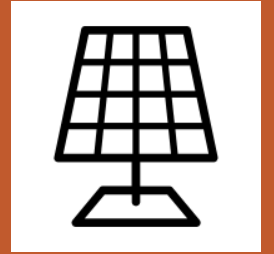
## Cost

What will it cost to install and operate systems



## System Types

roof, ground, carport



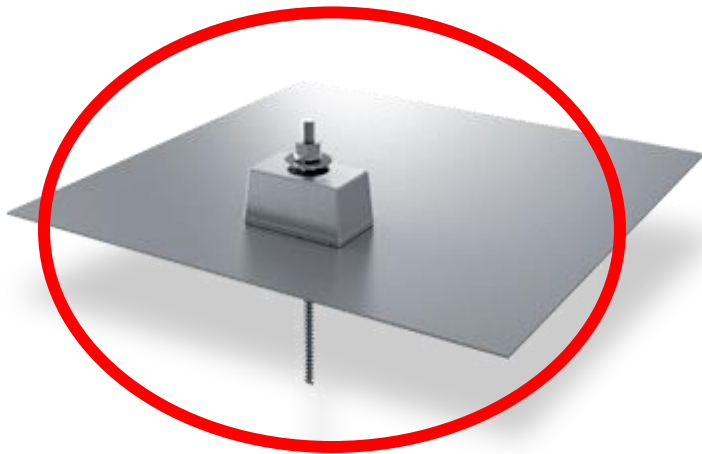
## Utility Policies

utility policy, net metering, incentives



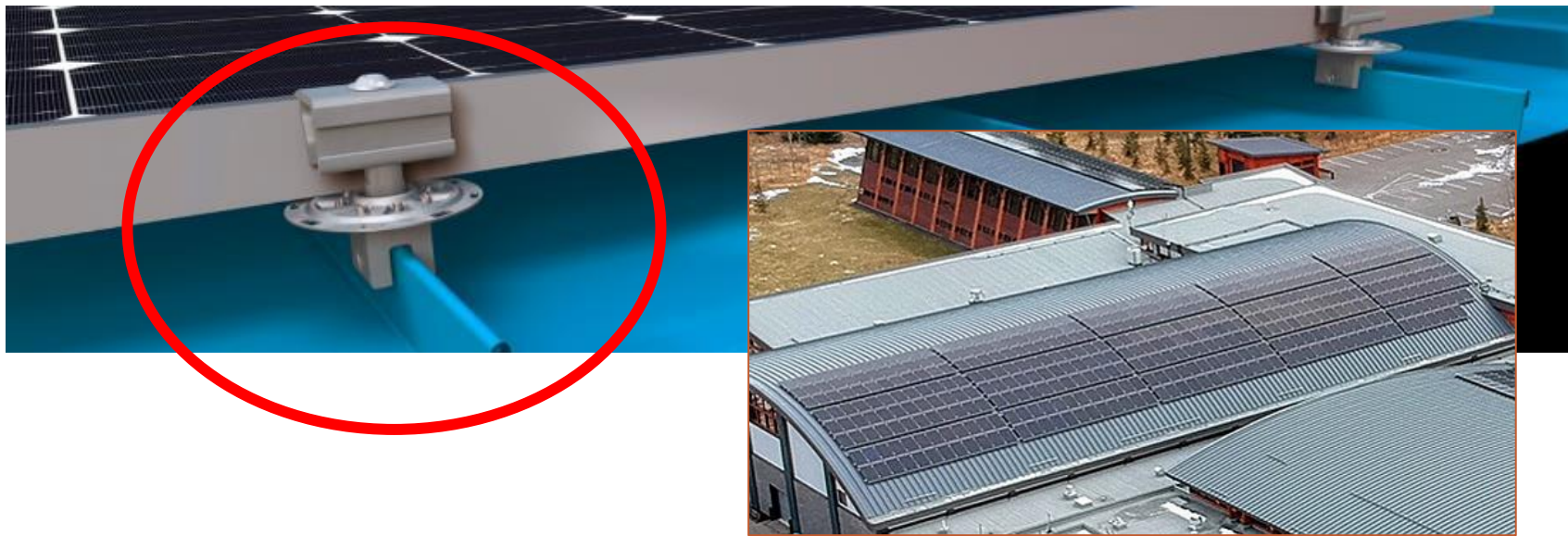
# Rooftop – Asphalt Shingle

- Residential market product
- Tilt matches roof pitch
- Flashing slides under roof shingle for waterproofing



# Rooftop – Standing Seam/Metal Roof

- Tilt matches roof pitch
- Common small commercial application
- Mounting clamp attaches to seam of roof
- No roof penetrations required





# Rooftop – Flat Roof Systems

- 5 to 10 degree tilt
- Ballasted – ideally no penetrations
- Roof structural validation required
- Roof warranty considerations





# Roof Mount: Other Considerations

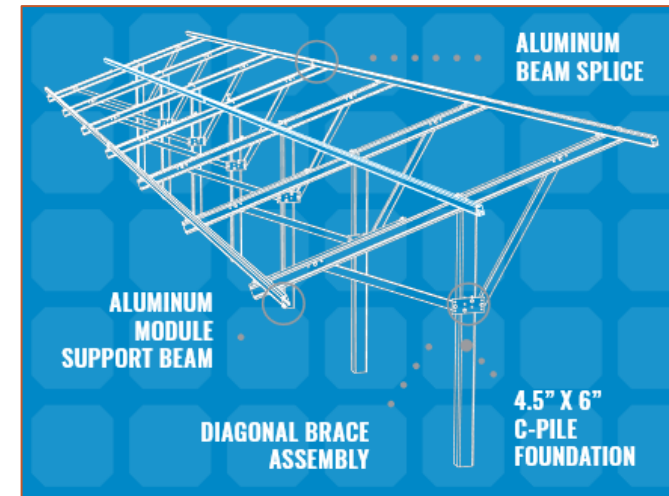
## Roof Mounted Solar

- Structural Capacity
- Interconnection Upgrades
- Roof Age (ideally less than 5yrs)
- Roof Warranty
- Shading/tree obstructions
- Future Development Plans
- HVAC equipment on roof



# Ground Mount - Fixed

- 20 to 30 degree tilt
- Posts typically driven in ground or ground screws used
- Soils investigation required
- Go-to option for smaller project (under 500kWdc), odd shaped land sites and heavy snow climates



# Ground Mount - Tracker

- Single Axis Tracker (SAT)
- Rotates East to West
- 15-20% higher energy yield than fixed tilt
- The go-to option for large ground mount projects (1-2MW +)!





# Ground Mount - Carport

- 5 to 12 degree tilt
- Single slope or inverted dual slope
- Module typically the structure 'roof'
  - Not waterproof
- Water/snow/ice management a concern
- Typically requires planning and zoning approval



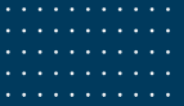


# Ground Mount: Other Considerations

## Ground Mounted Solar

- Land availability
- Distance from load (less than 1000ft ideally)
- Interconnection
- Topography
- Soils/Subsurface Conditions
- Environmental constraints
  - ☐ (i.e. wetlands, etc.)
- Existing easements
- Future development plans

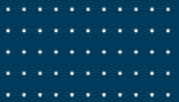




# Cost Profiles of Solar PV

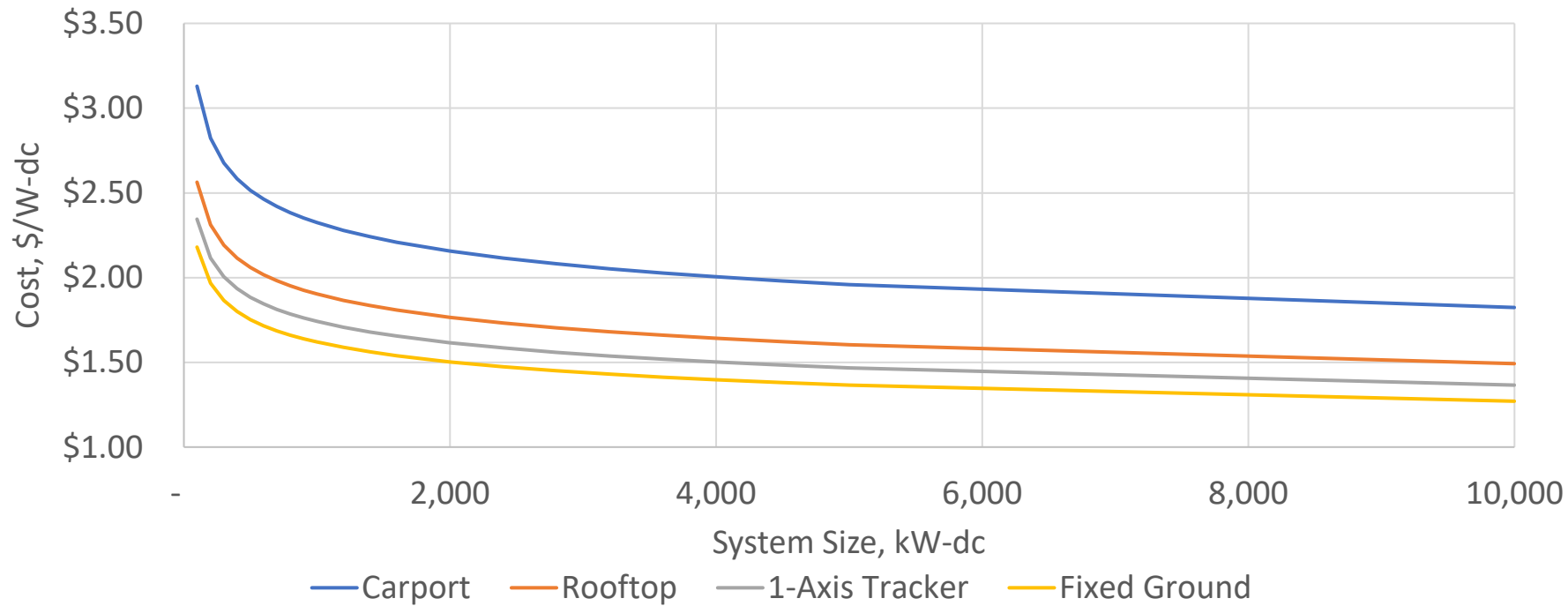
Application	Cost	Production	Economic Value
Ground Mount	\$	High	Very High
Rooftop	\$	Average	High
Carport	\$\$	Average	Average

- Ground Mount and Rooftop – best economic value
- The bigger the portfolio/array the better the economics!



# Cost vs Production By System Size & Type

Indicative Cost by System Type and Size



**System Size and Type Strongly Influence Installation Costs**

# Other Financial Considerations of Solar

- Investment thresholds
  - Internal rate of return?
  - Net Present Value?
- Simple payback
- Available capital
- Debt capacity
- Payment options





# Ownership Models: Direct Ownership



## Benefits

- Complete control of the system deployed
- No long term contracts
- No penalty for removal
- No constraints on future use of facilities
- No risk of PPA rate exceeding savings rate
- No risk of system ownership changes
- Control of system design = higher quality
- Can fund through EPC or CPACE programs
- Grant funding

## Drawbacks

- Responsible for system maintenance (or contract)
- Bear the risk of ownership

# Ownership Models: Third Party



## Benefits

- No upfront cost
- Only pay for kWh produced
- Power purchase agreement (PPA) investor has access to tax benefits
- PPA investor handles design, build, and system commissioning through a direct contract with the PPA investor
- PPA investor responsible for system maintenance
- Can typically buy out the contract after six years

## Drawbacks

- Risk of utility rates being lower than PPA rates
- 20 to 25 year contract term
- Restrictions on future use of facilities
- More expensive project overall

# NW Colorado Regional Case Study





# Project Timeline

## On Going Collaboration with:

- YVEA
- All Partners
  - DOLA
  - McKinstry
- State Energy Office
  - Local subs
  - And many others!

Project Kickoff – March 2020

Preliminary Development

30% Preliminary Findings Meeting – June 2020

Rough Order of Magnitude (ROM) Development

60% Presentation – Sept 2020

DOLA Application, Funding Strategies Developed

DOLA Award, 90% Meetings – Jan 2021

Funding Secured, Approvals, Contracts – Q1 2021

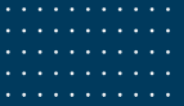
Construction Phase – May 2021/On-going

Ribbon cutting @YVRA tomorrow 11/19!



# Regional Partnership

Stakeholder	Project Name	Size (kW DC)	PV Application	Year One Solar Production (kWh)	Annual Usage (kWh)	Solar Offset
City of Craig	Wastewater Treatment Plant	271.8	Ground Mount	430,170	1,173,884	~37%
	Water Treatment Plant	209.1	Ground Mount	325,170	1,410,159	~23%
City of Steamboat	Transit Operations Center	41.8	Ballasted Rooftop	57,120	155,879	~37%
	Wastewater Treatment Plant	418.2	Ground Mount	655,900	2,572,918	~25%
Moffat County	Safety Center	209.1	Ground Mount	321,370	680,884	~47%
Moffat County School District	High School Campus	244	Ground Mount	383,000	992,948	~39%
Town of Hayden	Police Station	36.9	Ballasted Rooftop	46,170	49,083	~94%
	Redevelopment Building	175.3	Ballasted Rooftop	300,470	375,391	~103%
	Wastewater Treatment Plant	209.1	Ground Mount	329,080	598,841	~55%
Town of Oak Creek	Town Hall	20.5	Ballasted Rooftop	23,520	53,520	~44%
Town of Yampa	Emergency Services Building	8.2	Ballasted Rooftop	17,390	13,600	~100%
Yampa Valley Regional Airport	Airport	250.9	Ground Mount	383,450	1,517,943	~25%



# Project Financials & Payback

Total Project Investment:	\$5.2M
DOLA Grant Funding Requested for Implementation:	\$2.1M
Total Financed Project Cost (through EPC):	\$3.1M
Annual Utility Savings:	\$310,000
Payback with DOLA Grant:	11 years
DOLA Award for Feasibility Study/Audit	\$267,000

# Benefits of a Regional Partnership Approach

- ✓ Bulk purchase pricing
- ✓ Idea sharing/lessons learned
- ✓ Economies of scale = reduced costs
- ✓ Enables diversity of project sizes & types, enhancing impact and community visibility
- ✓ Improved chances of grant funding
- ✓ Regional benefits
- ✓ Working together to achieve goals
- ✓ Enhances local economy

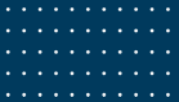


# Key Takeaways



- Understand your project economic goals.
- Understand the technical viability of your site by onboarding a potential developer as soon as possible.
- Look at financial and technical viability of project side by side.
- The larger the array, the better economies of scale and lower cost.
- Reduce. Optimize. Produce.  
Efficiency first, then renewables!



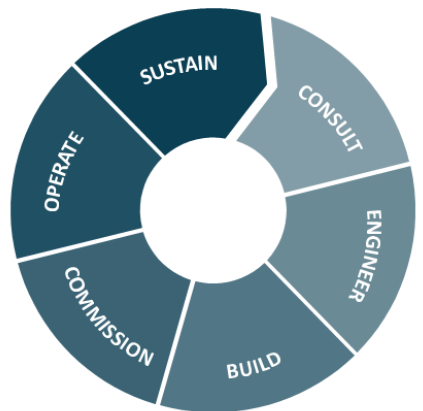


# About McKinstry

## 60+ years

Design-Build-Operate-Maintain (DBOM)  
Over 2,000 Employees

### Full Cycle of Services



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Creating a continuum of expertise and assistance that you can access at any point in the life of your building.

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Questions?