Portage Solar Farm

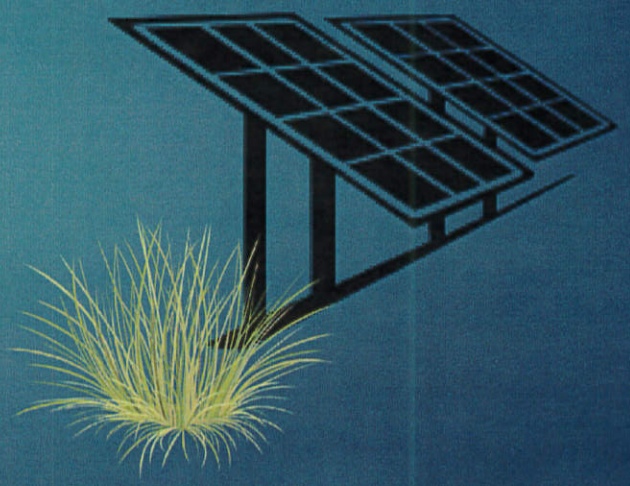
30 ACRES

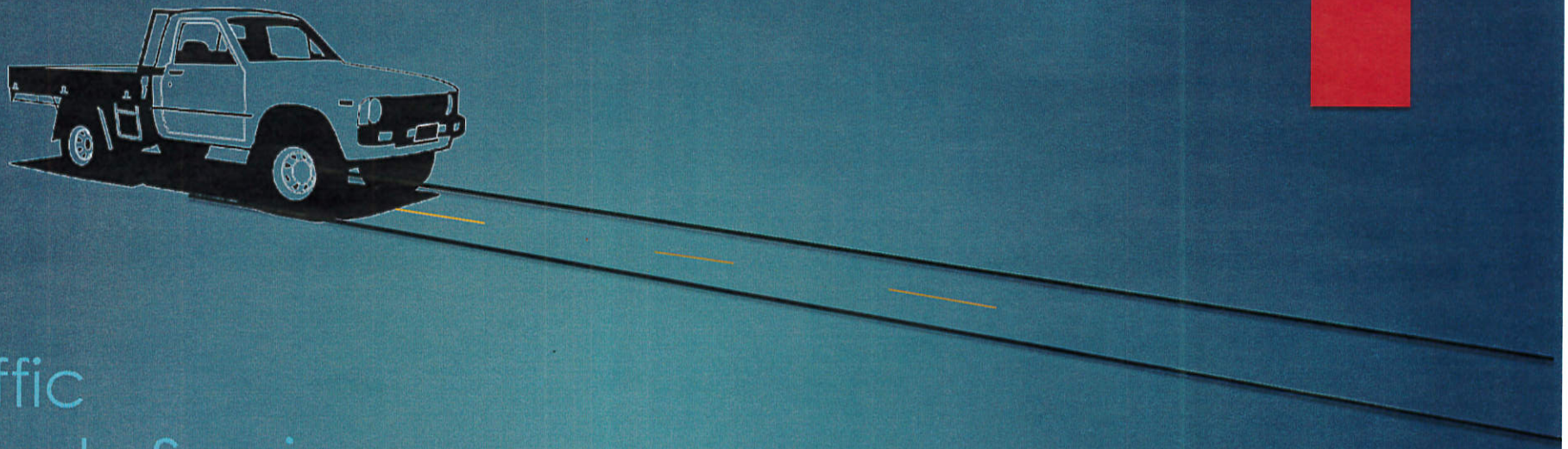
PHOTOVOLTAIC SOLAR ARRAY

CONVERSION OF SUNLIGHT INTO ENERGY

INTERCONNECTED TO EXISTING ELECTRICITY GRID

POWER IS UTILIZED LOCALLY





Traffic
County Services

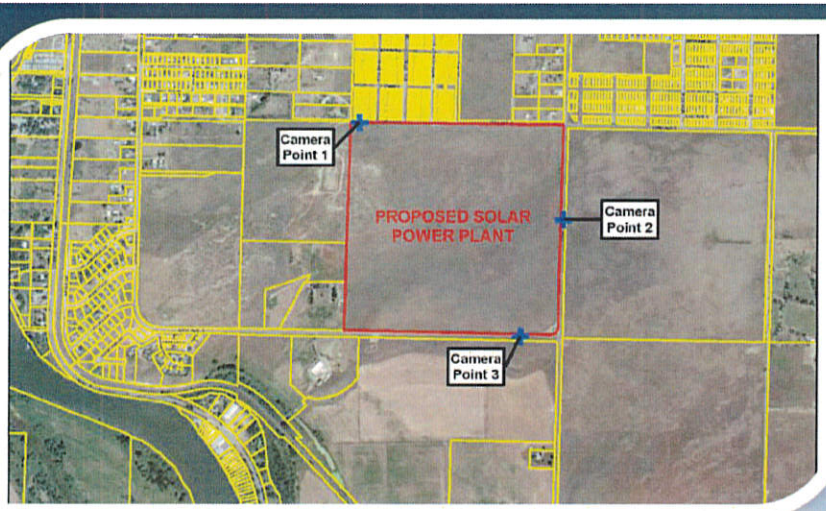
Water

Soil

Weed Mitigation

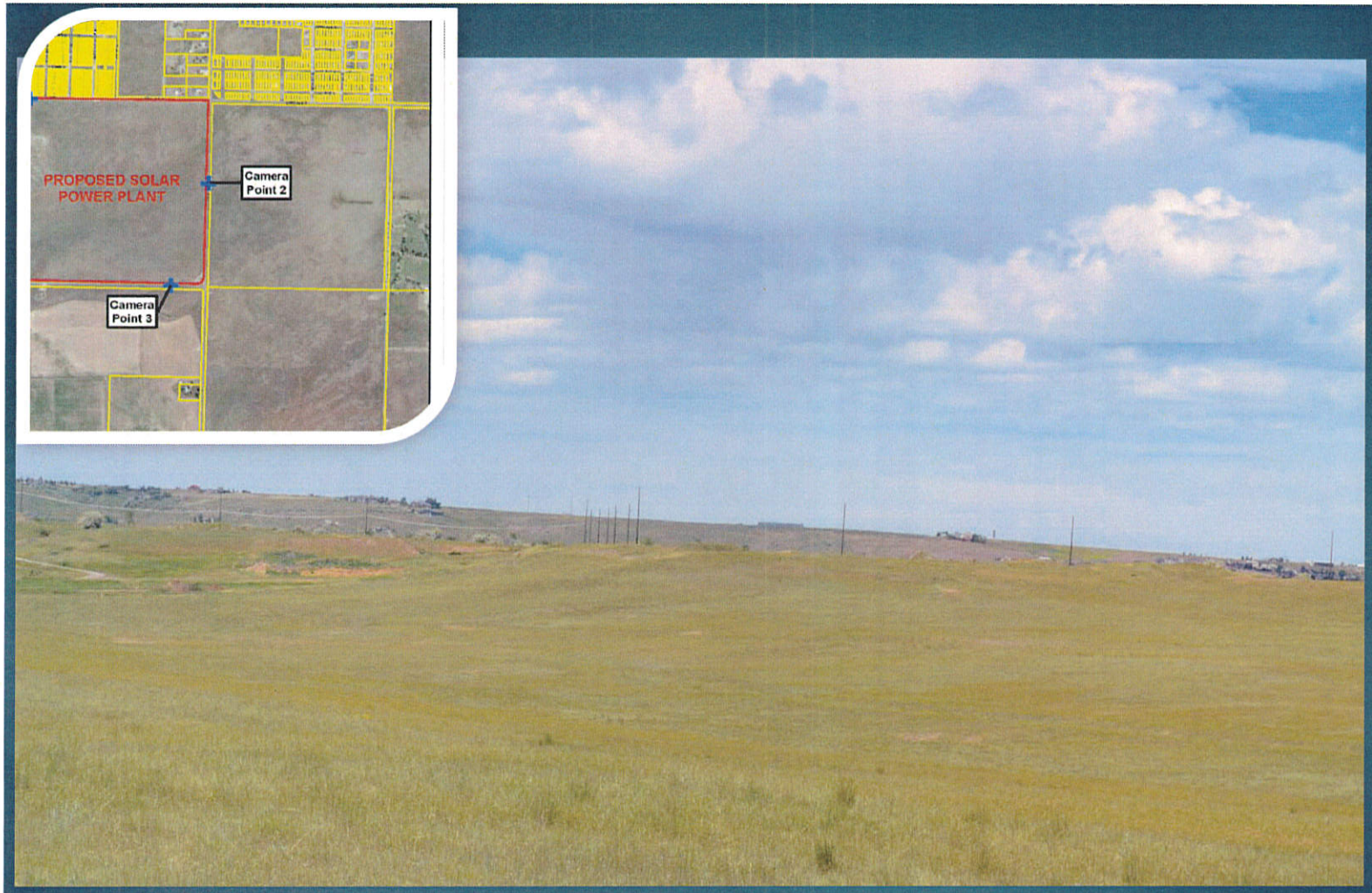
Maintenance of the Site

My Neighbor is a solar Farmer



Existing Conditions

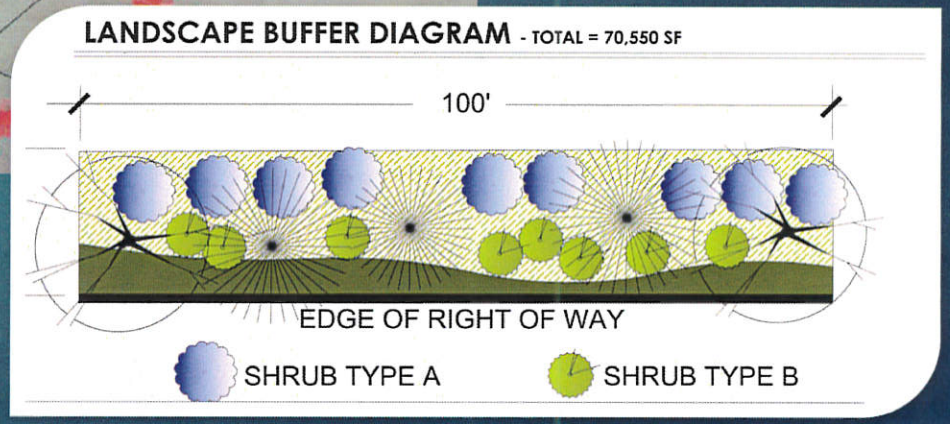
Northern Project Corner on 33rd Ave S. Looking S

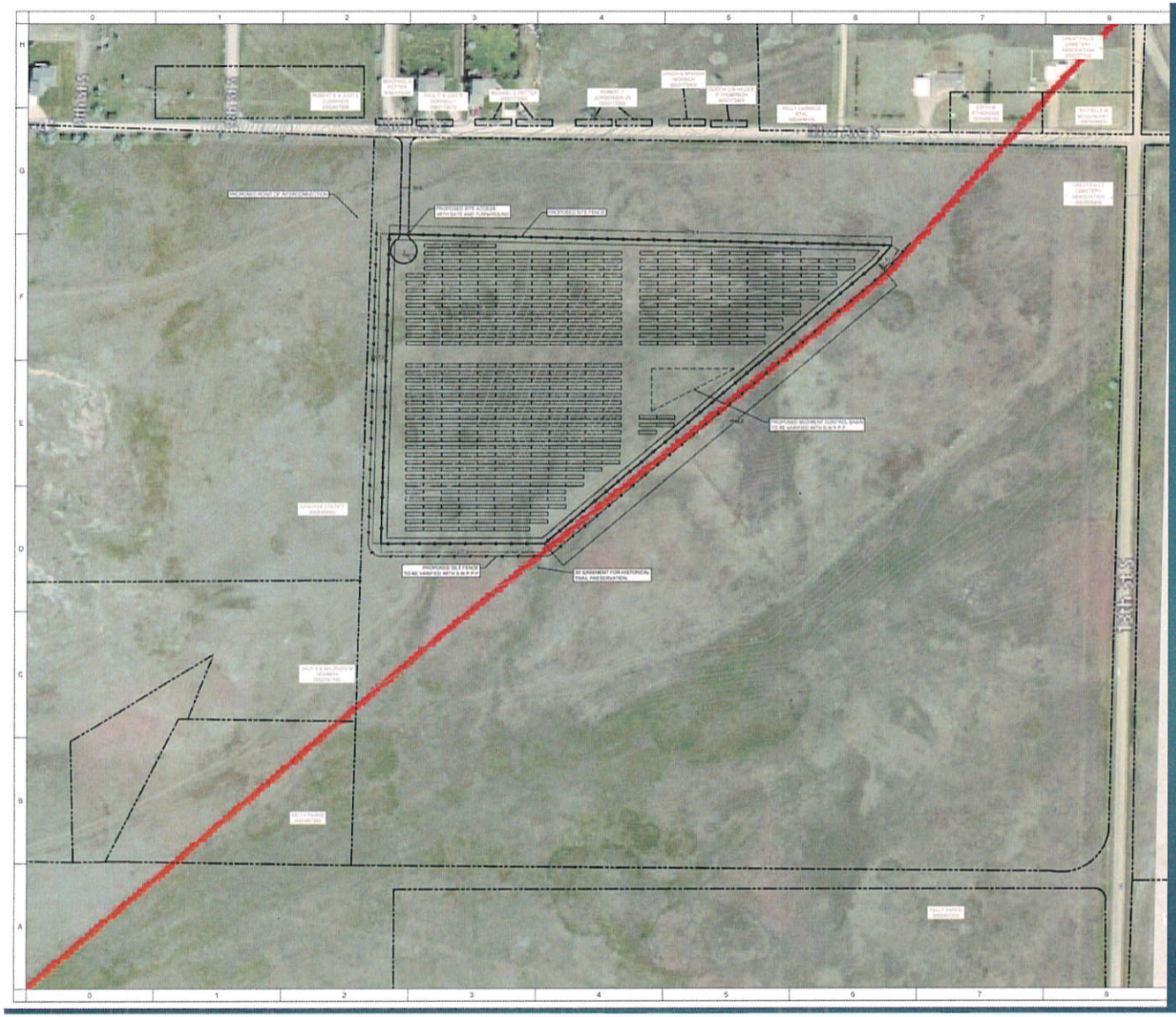


Existing Conditions

13th Ave looking North West

Screening 33rd Ave S. & 13th St. S



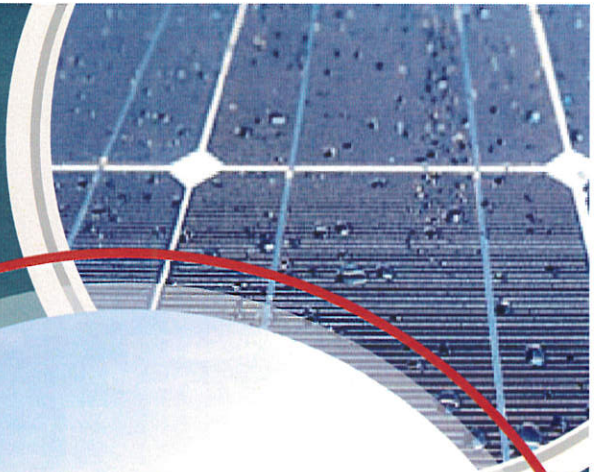


Site Plan

SOLAR PHOTOVOLTAIC TECHNOLOGY

Common Questions

1. Is heat is created?
2. How big is the solar project?
3. What are the solar panels made with?
4. Do plants grow well in solar arrays?
5. How much light is reflected?
6. How much sound is created?
7. Are their EMF risks?
8. What are the safety risks?
9. How do the economics work?



"Leaders in Local Solar."

Is Heat Created?

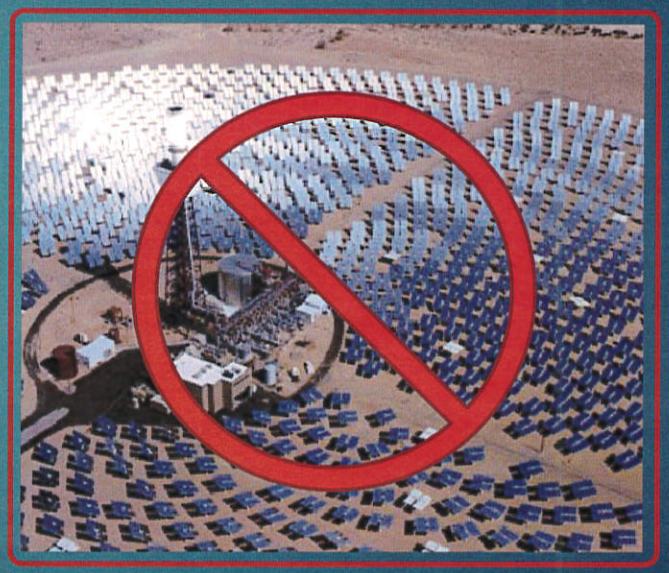
CYPRESS CREEK RENEWABLES EXCLUSIVELY BUILDS PHOTOVOLTAIC SOLAR POWER PLANTS

SOLAR PHOTOVOLTAICS

Sunlight to electricity: Simple, inexpensive, safe.

SOLAR THERMAL

Sunlight to heat: Complicated, expensive, dangerous.



How Big is the solar Project?

FOX AND PORTAGE ARE 3 MW SOLAR FARMS COVERING 30 ACRES

EXAMPLE PROJECT: KIRKWALL

5 MW, 40 acres

COMPARISON: FOX AND PORTAGE

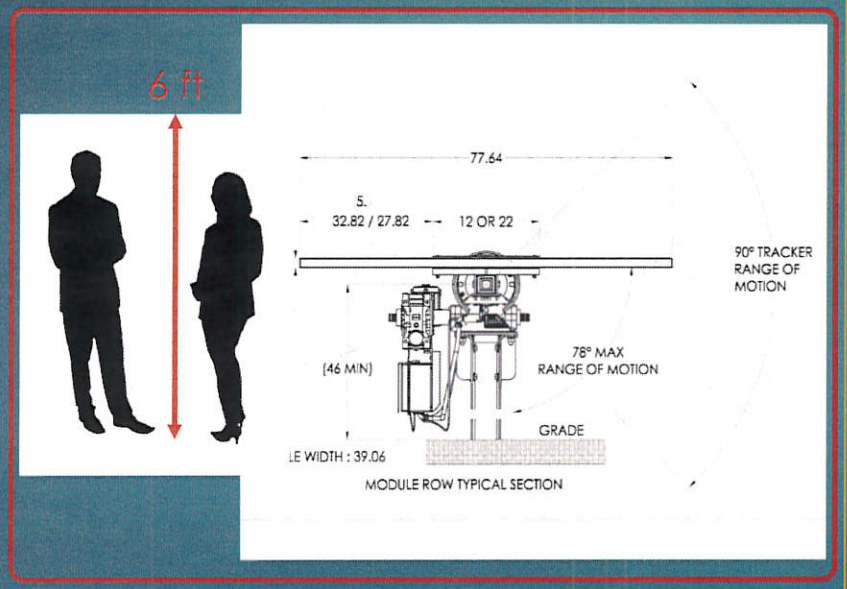
3 MW, 30 acres

How Big is the solar project?

FOX AND PORTAGE USE SINGLE AXIS TRACKERS AND PHOTOVOLTAIC MODULES

SINGLE AXIS TRACKING

Height is 6-8 feet at the top



ROWS ARE 10-12 FEET APART

Covering ~40% of the ground.

WHAT ARE THE SOLAR PANELS MADE WITH?

Non-Toxic, Solid State

Crystalline Silicon

Most common technology - 90% of all solar panels installed

Silicon is non-toxic - "beach sand"

~~The most abundant element on earth~~

Copper-Indium-Selenium - CIS

Alternative "thin film" technology

~~Copper, Indium, and Selenium are non-~~toxic

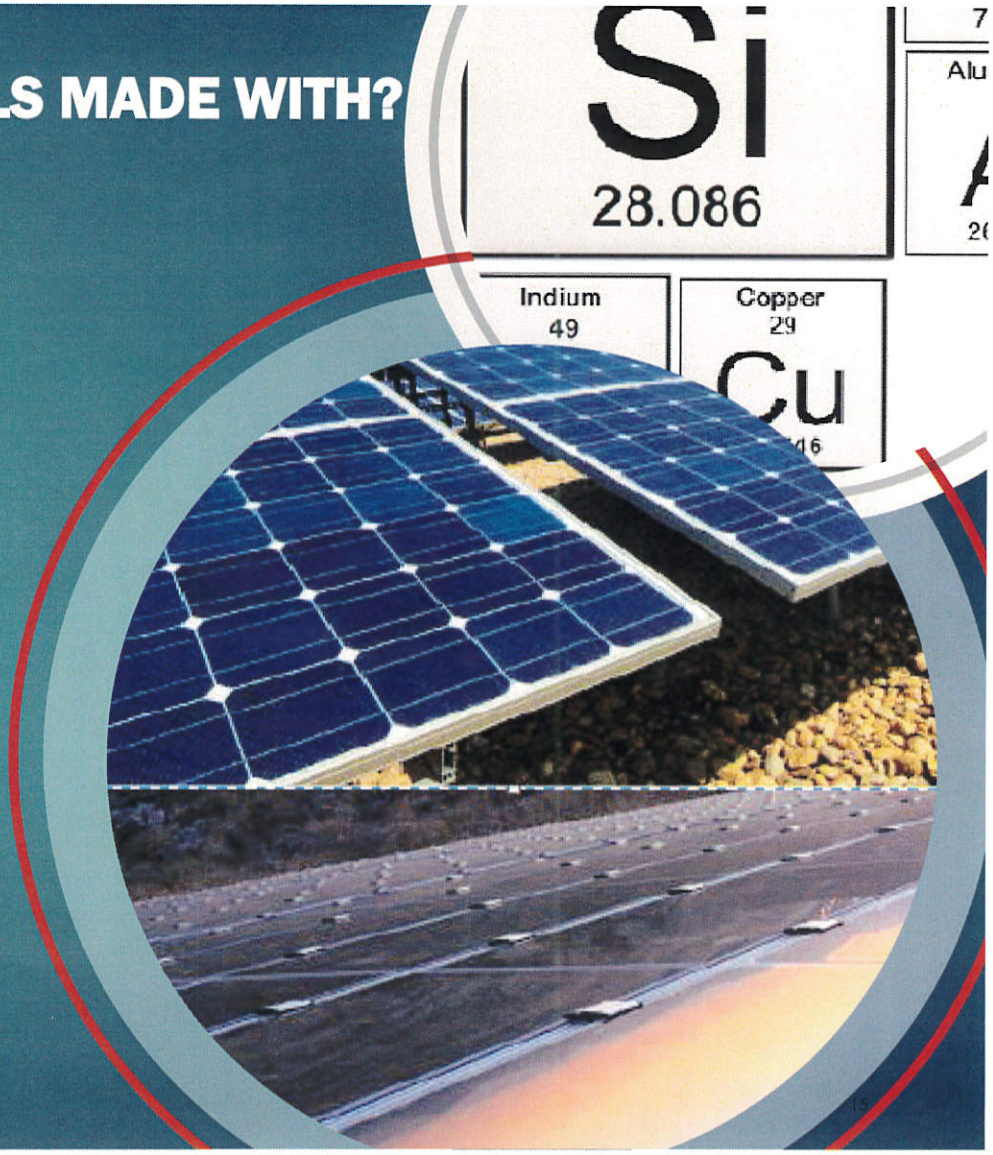
Aluminum and Glass

Front of module is covered by anti-reflective glass

Edge of module is an aluminum frame

Module circuitry is aluminum

No fluids, no chemicals, no leaks



Do Plants grow well in Solar Arrays?

RECOVERY IS QUICK. EXAMPLE PROJECT: CB BLADEN (LOCATED IN NC)

CONSTRUCTION FINISHED – FEB 12, 2016

FOUR MONTHS LATER – JUNE 15, 2016

Vegetation Regrowth

EXAMPLE PROJECT: ANGEL (LOCATED IN NC)

CONSTRUCTION FINISHED – NOV 8, 2015

FIVE MONTHS LATER – APRIL 13, 2016

Vegetation Regrowth

UP CLOSE VIEWS AFTER FOUR TO FIVE MONTHS

CB BLADEN

ANGEL

HOW MUCH LIGHT IS REFLECTED?

Minimal Reflected Sunlight

No Glare

The solar panels are design to absorb as much light as possible

Anti-reflective glass coating

Sun angles and panel angles reflect light towards the sky

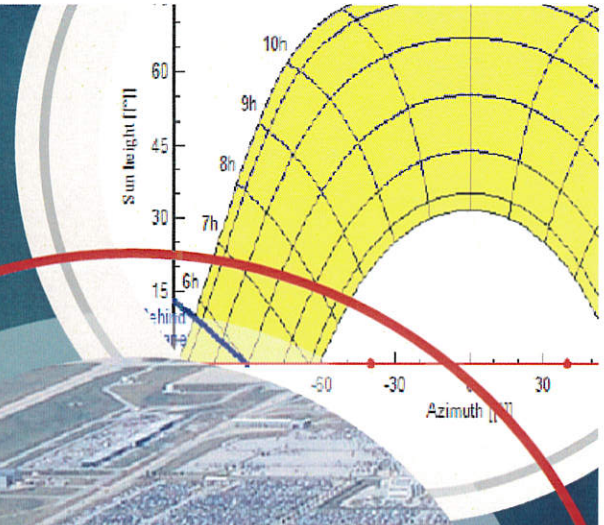
Safe for Airplanes

Solar arrays require FAA Glare Hazard Studies

Not one solar array has been considered a glare hazard

Some airports have solar arrays in them

Indianapolis Airport

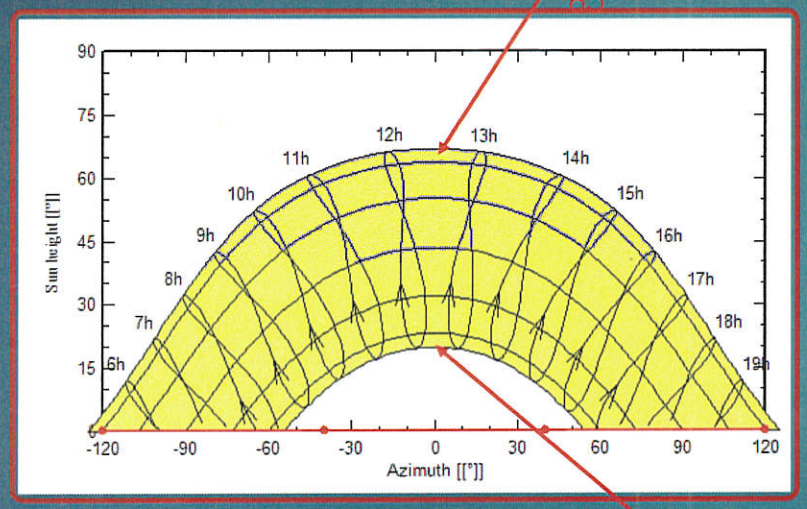


How Much Light is Reflected NORTH?

EXAMPLE: PORTAGE SOLAR

SUN PATH FOR GREAT FALLS, MT

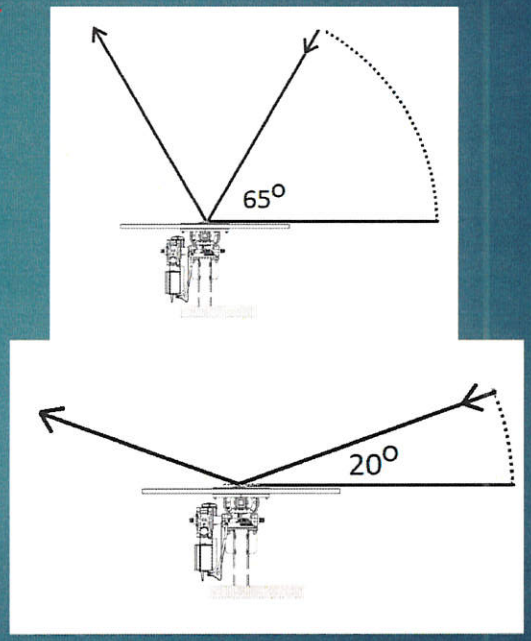
Noon on June 21st – 65°



Noon on December 21st – 20°

SOLAR PANELS AT NOON

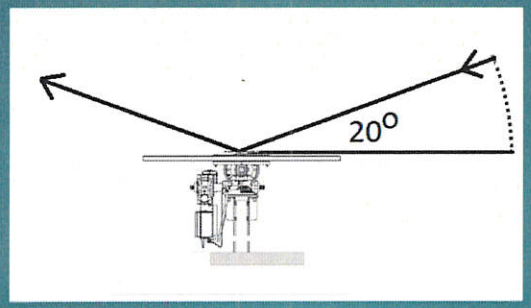
Sunlight is reflected North



How Much Light is Reflected NORTH?

EXAMPLE: PORTAGE SOLAR

ELEVATION DECREASE GOING NORTH



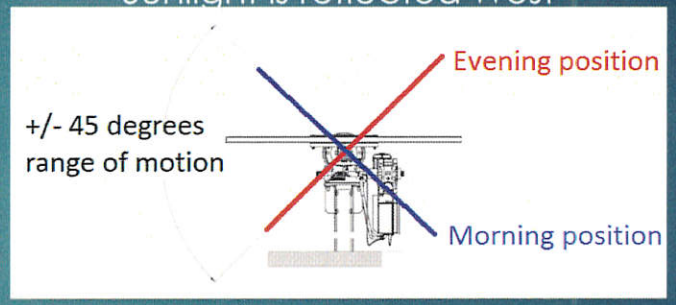
Not Possible for direct sunlight to be reflected on properties to the north, even on lowest sun angle of the year (noon on Dec 21st).

How Much Light is Reflected WEST?

EXAMPLE: PORTAGE SOLAR

SOLAR PANELS AT SUNSET

Sunlight is reflected West



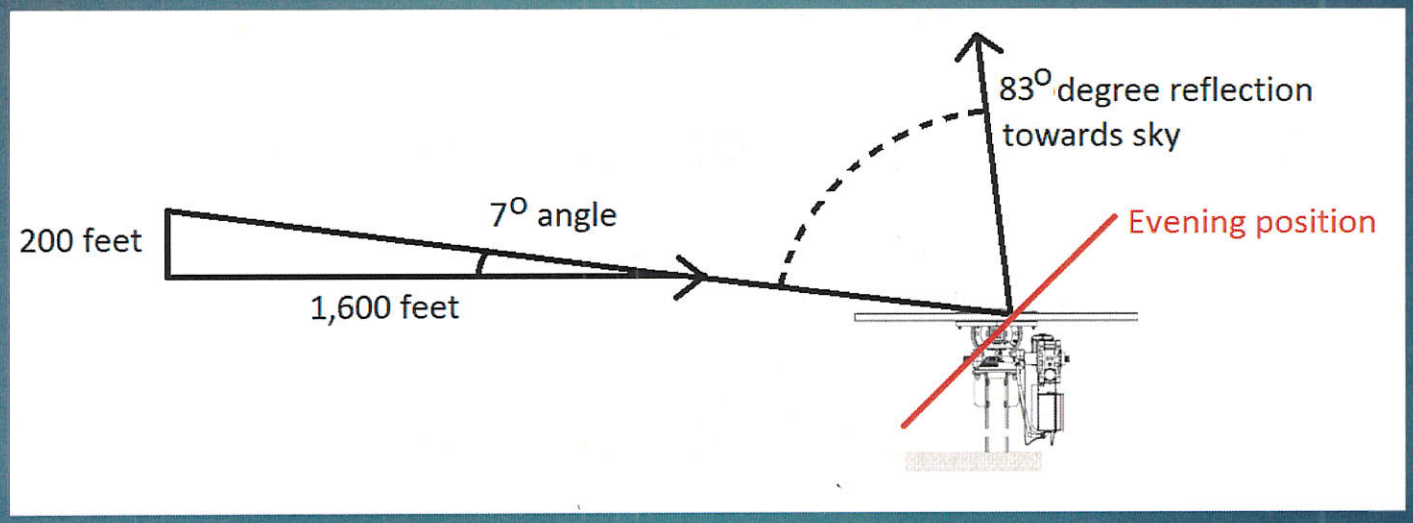
The closest point on the bluff is 1,600 feet away and 200 feet above Fox

How Much Light is Reflected WEST?

EXAMPLE: PORTAGE SOLAR

SOLAR PANELS AT SUNSET

Sunlight is reflected West



Due to max tilt angle of the panels, all light reflected in the evenings is towards the sky. It is not possible for light to be reflected towards properties to the West.

HOW MUCH SOUND IS CREATED?

Minimal Sound, No Moving Parts

Inverters are the only source of noise

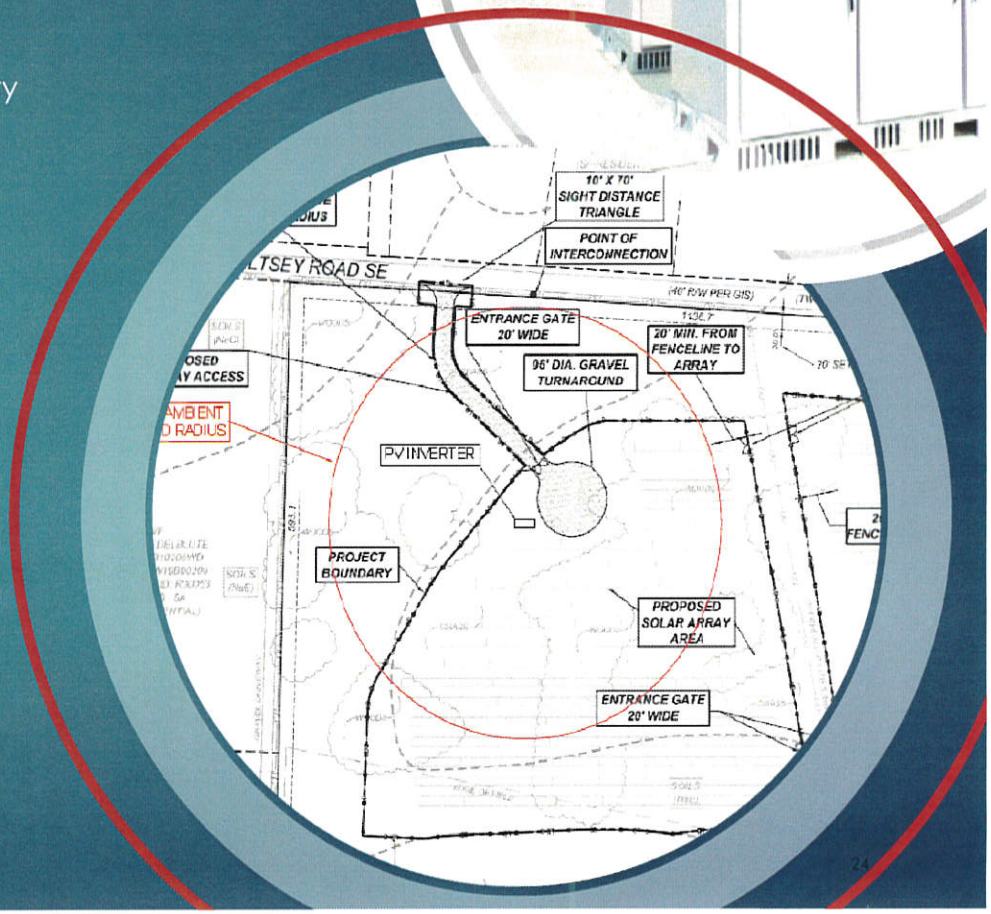
The inverters convert DC electricity to AC electricity

They have a fan that keeps them cool during the daytime

At 150 feet, you cannot hear the inverters.

No noise is created when the sun is down

We located inverters 500 feet from the edges as an extra buffer.



ARE THERE EMF RISKS?

Weak source of EMFs, even up close.

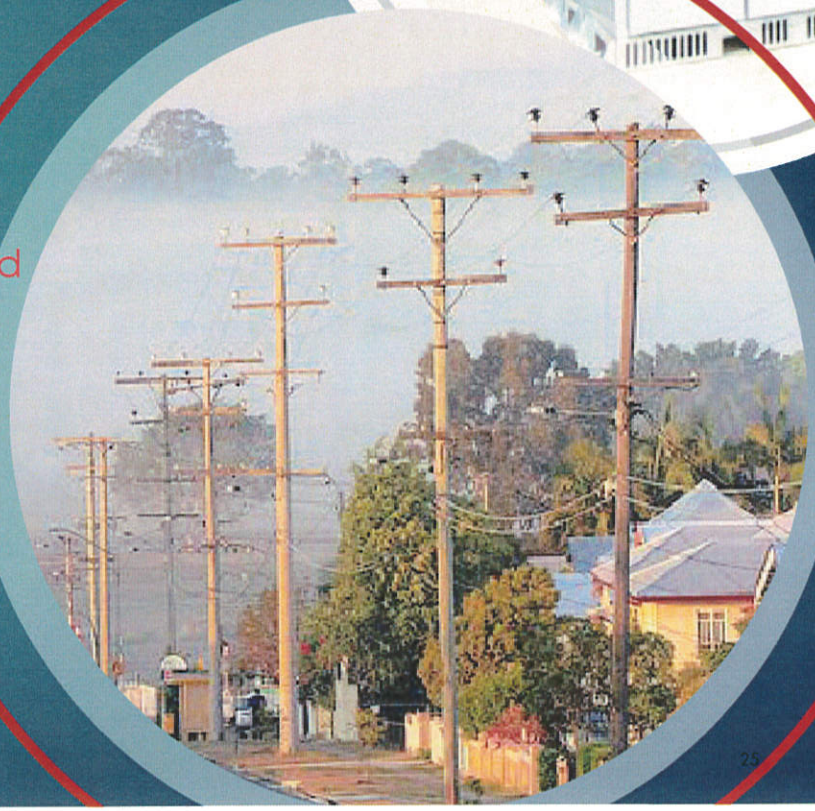
Electromagnetic Fields

Everything in nature produces electromagnetic fields

The inverters produce the "strongest" EMFs in the solar farm, but are many times less powerful than normal overhead power lines.

At 150 feet from the inverters, no EMFs can be detected above the Earth's magnetic field

Same as for sound, the inverters are located 500 feet from the edges as an extra buffer.



WHAT ARE THE SAFETY RISKS?

No safety risks to the community

Engineering

Solar power plants are designed by licensed engineers

Civil, Structural, and Electrical designs

Erosion, Stormwater, and Sediment Control

Building and Electrical Permits

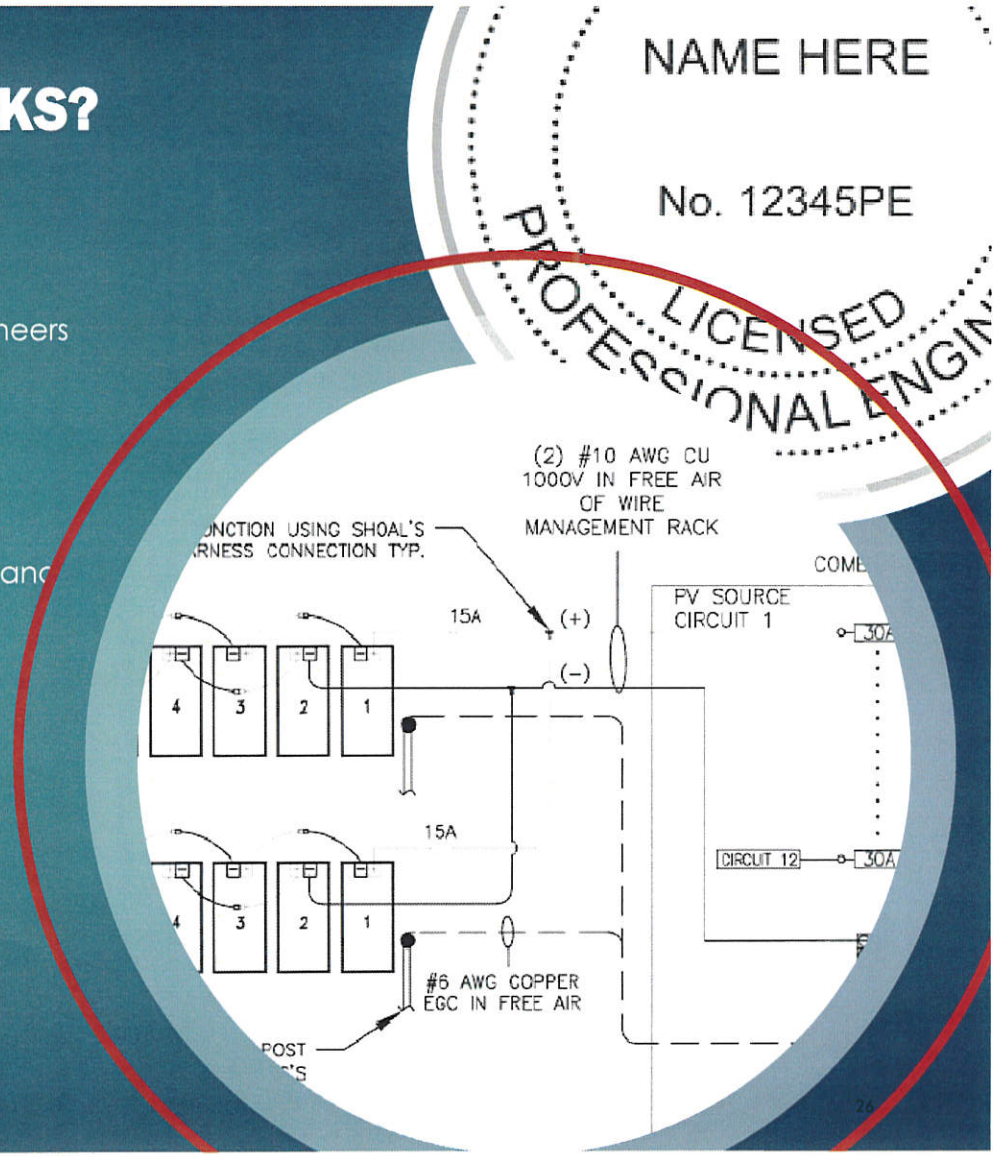
All system designs are approved by local building and electrical authorities

National Electric Code compliant

Safety

Perimeter fencing to prevent trespassing

Vegetation maintained to prevent overgrowth



"Leaders in Local Solar."

HOW DO THE ECONOMICS WORK?

Economics of Solar Development

Weather Record

Historical data of sunlight, temperature, and wind speeds from 1960

Expected sunlight per year

Energy Model

Highly accurate solar energy simulations

Expected energy generation per year

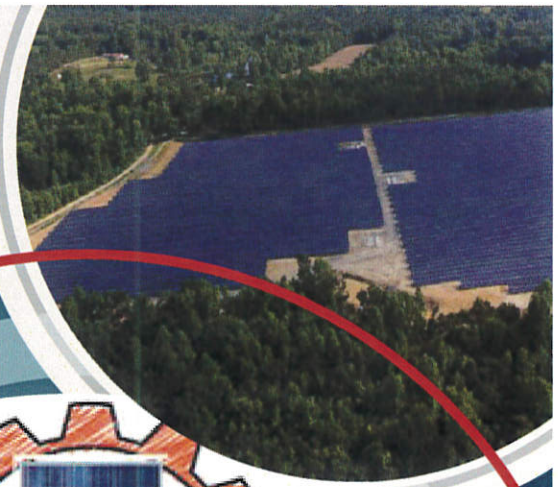
Power Purchase Agreement

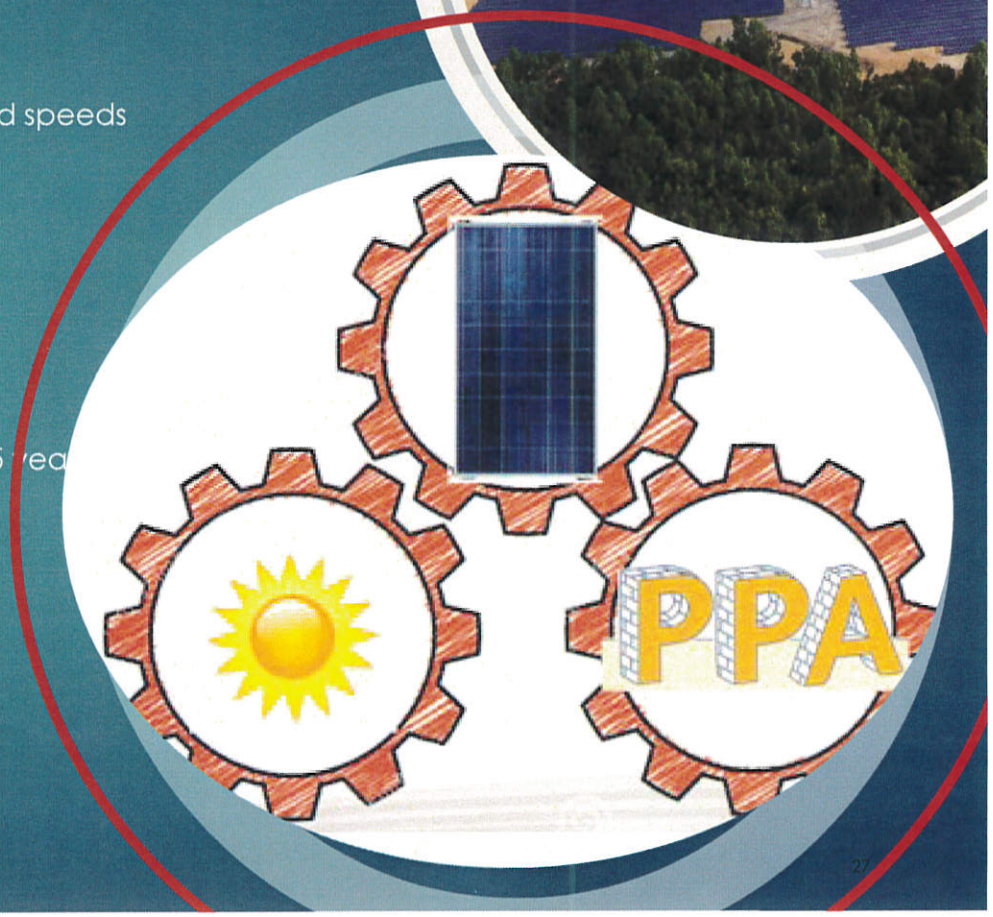
Contract with utility to buy power for 15, 20, or 25 yea

Expected revenue per year

Project revenue over project lifetime exceeds project development, construction, and operations costs

PPA with NorthWestern energy for ~6.5 cents/kWh

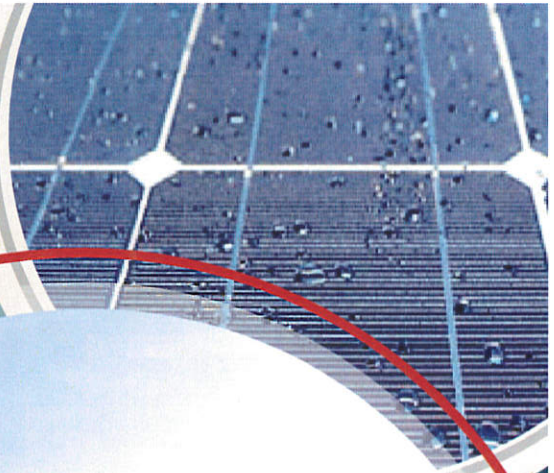




SOLAR PHOTOVOLTAIC TECHNOLOGY

Common Questions

1. Is heat is created
2. How big is the solar projec
3. What are the solar panels made w
4. Do plants grow well in solar arra
5. How much light is reflecte
6. How much sound is create
7. Are their EMF risks?
8. What are the safety risk
9. How do the economics wo



EMPLOYMENT IN THE SOLAR INDUSTRY?

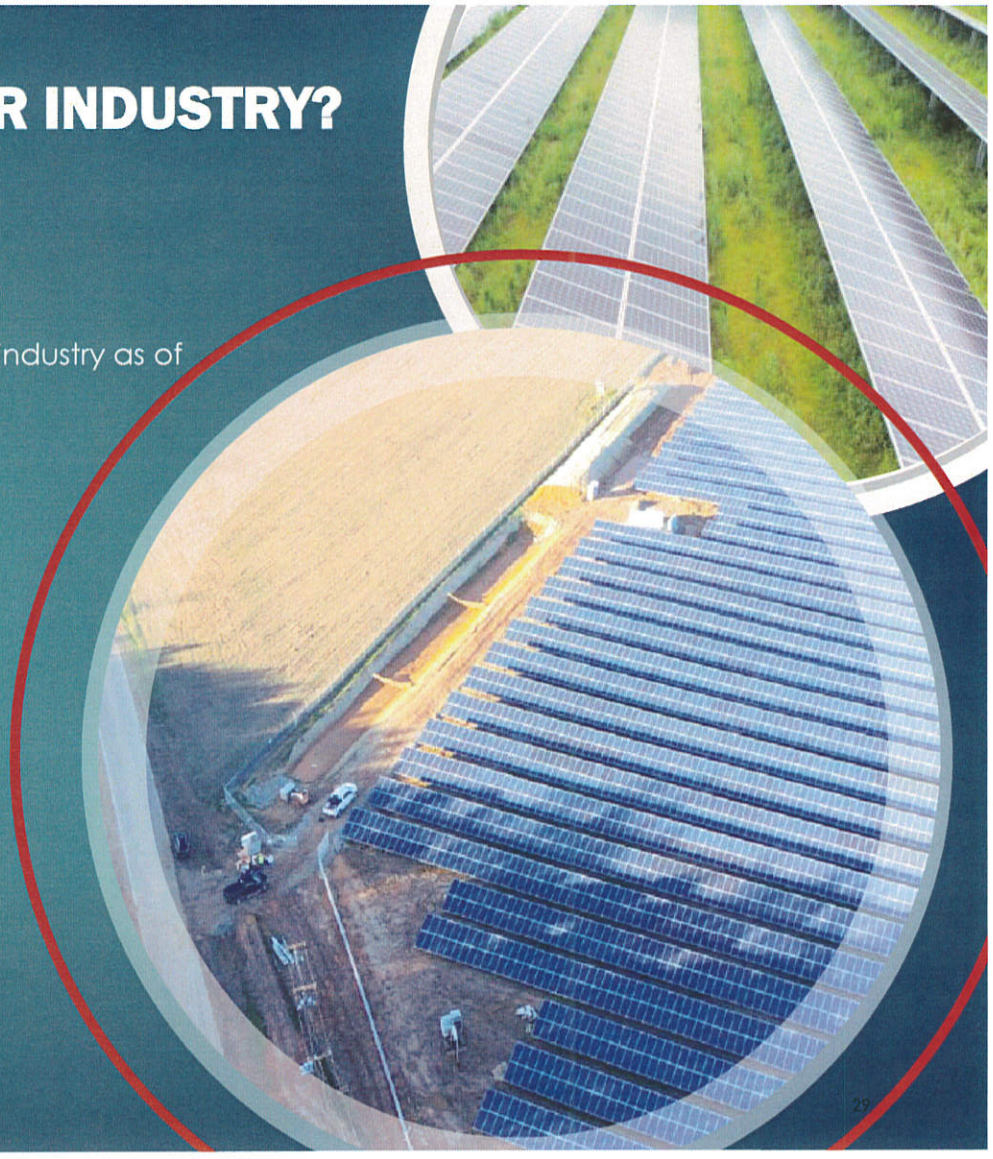
Employment

Nationwide

The US employs over 280,000 people in the solar industry as of 2016

Cypress Creek Renewables

Employs 150 people directly

Employs over 4,000 contractors indirectly

The solar is a growing industry, and was directly responsible for 1 out of 83 new jobs created last year.