Planning for Solar Energy

Broome County Department of Planning and Economic Development

Frank Evangelisti, Director
607 778-2414
fevangelisti@co.broome.ny.us

Topics

- Types of Solar Energy
- Comprehensive Plan
- Zoning
  - Solar as an Accessory Use
  - Solar as a Primary Use
  - Defining Solar
  - Protecting Solar Access
- Installation and
  - Decommissioning
- Additional Solar Resources

Solar Growth

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TECH GTM RESEARCH

Solar panels just broke another record in the U.S.

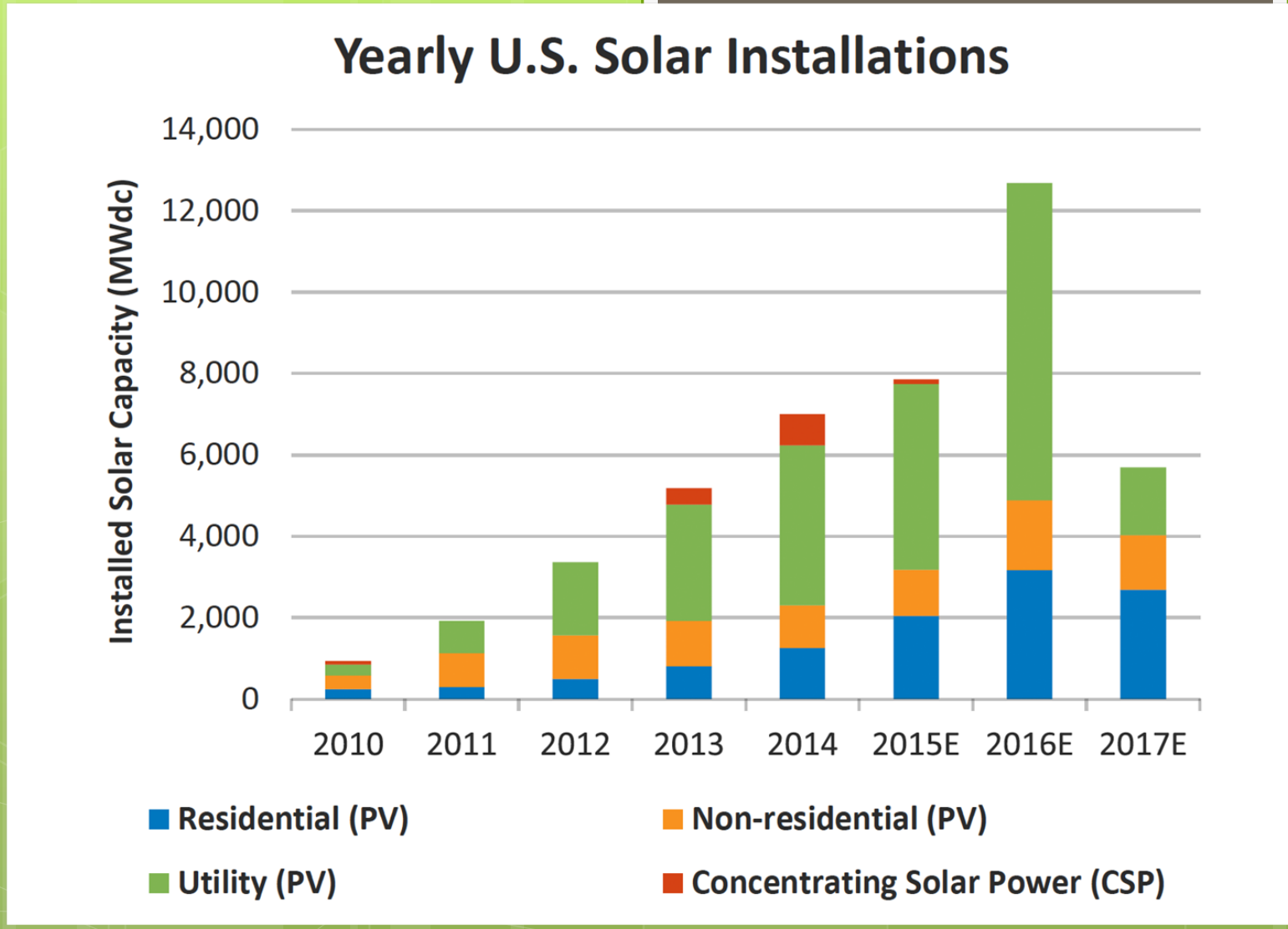
by Katie Fehrenbacher @katiefehren SEPTEMBER 9, 2015, 6:00 AM EST

More American homes than ever before are getting solar panels.

A SolarCity employee carries a solar panel being installed on the roof of a home in the Eagle Rock neighborhood of Los

"The amount of home solar roofs grew 70% year-over-year" – *Fortune Magazine*

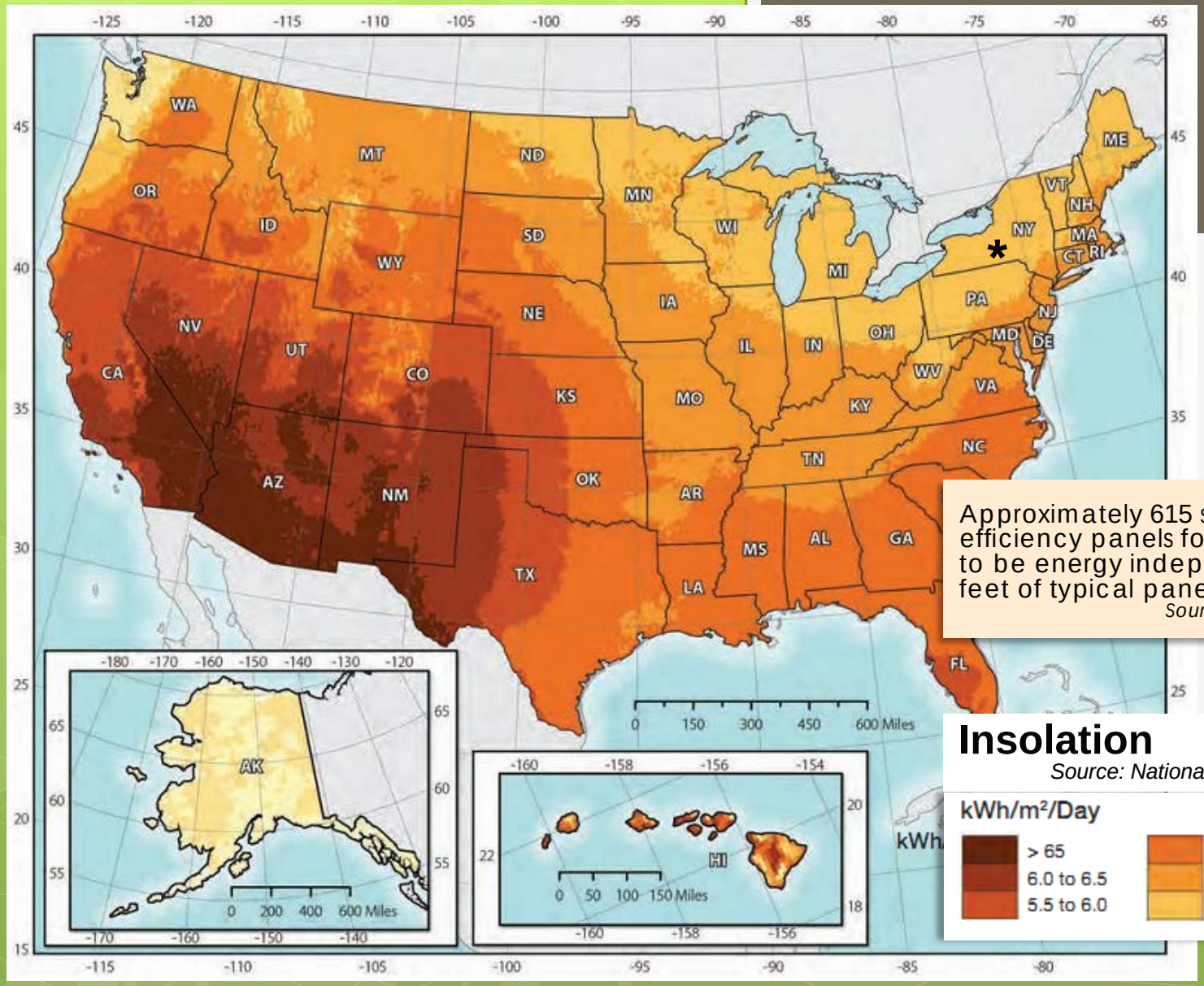
Solar Growth



GTM RESEARCH

SEIA

Solar Potential



Approximately 615 square feet of high efficiency panels for a home in this area to be energy independent (861 square feet of typical panels).

Source: MIT School of Engineering

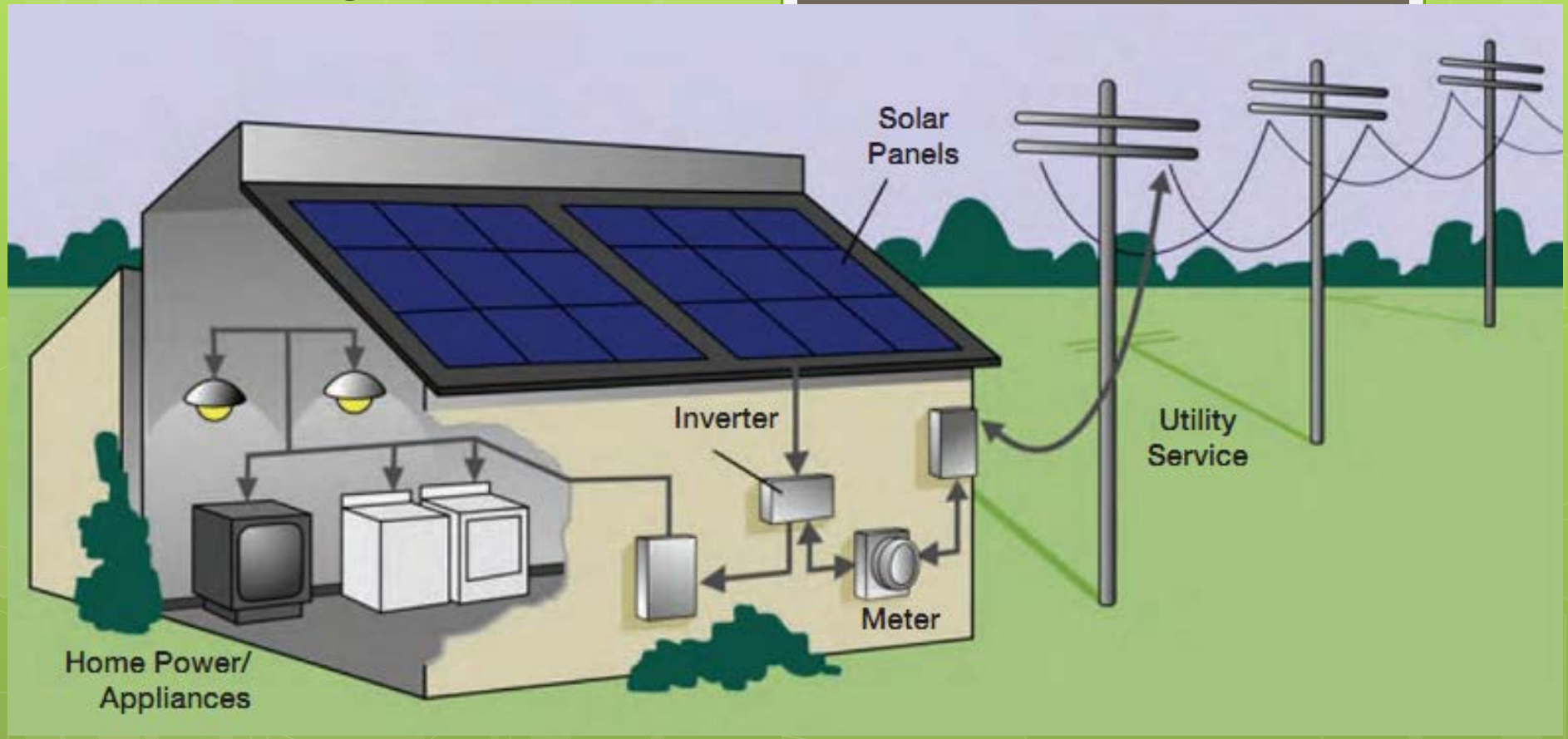
Insolation

Source: National Renewal Energy Laboratory

Types of Solar Energy Systems

Types of Solar Energy Systems

1 **Solar Photovoltaic Cells** – Produce electricity directly from sunlight



Types of Solar Energy Systems

1 **Solar Photovoltaic Cells –** Produce electricity directly from sunlight

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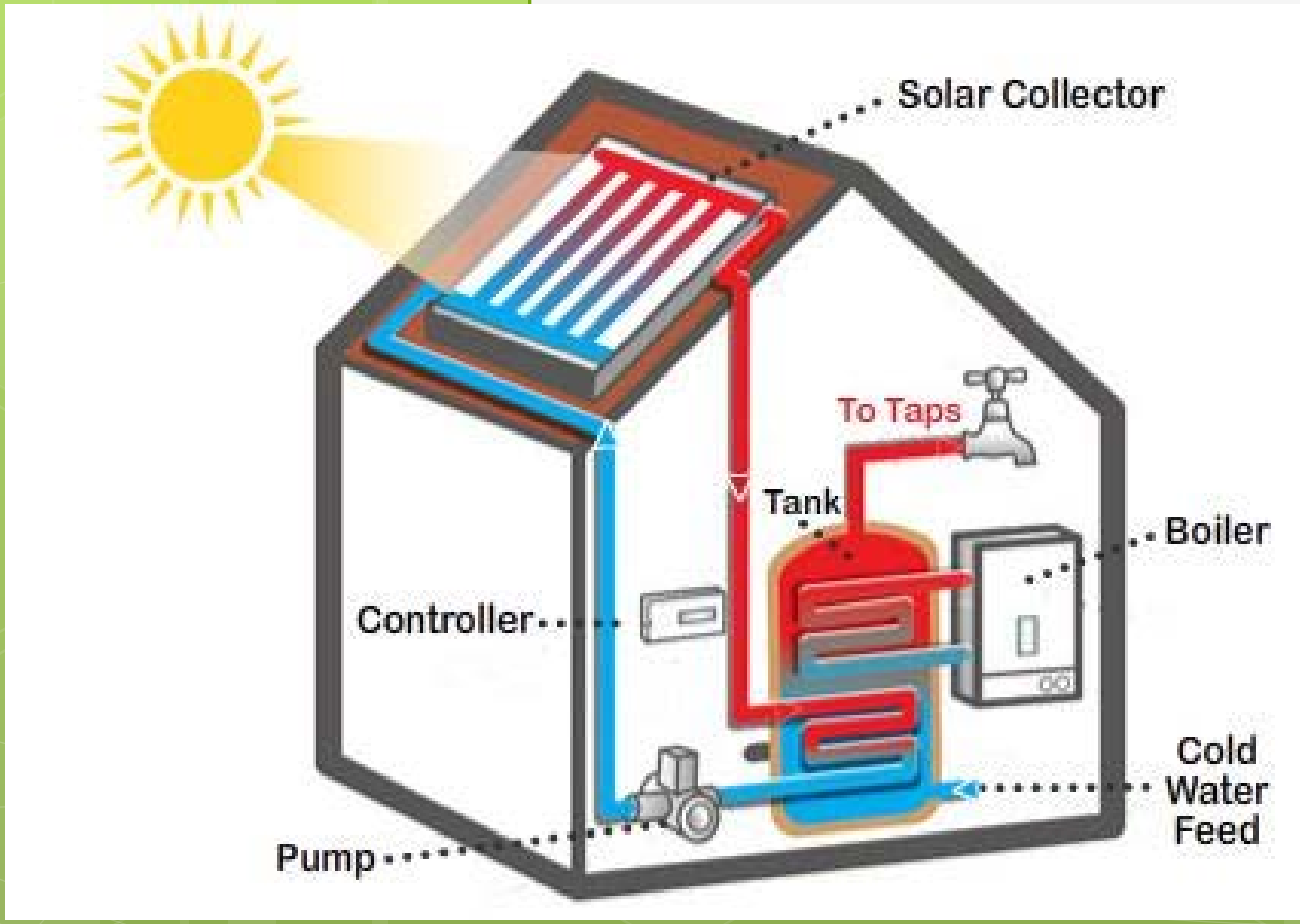
Types of Solar Energy Systems

2 **Solar Thermal (Hot Water) Systems –**
Absorbs sun's rays to heat domestic water



Types of Solar Energy Systems

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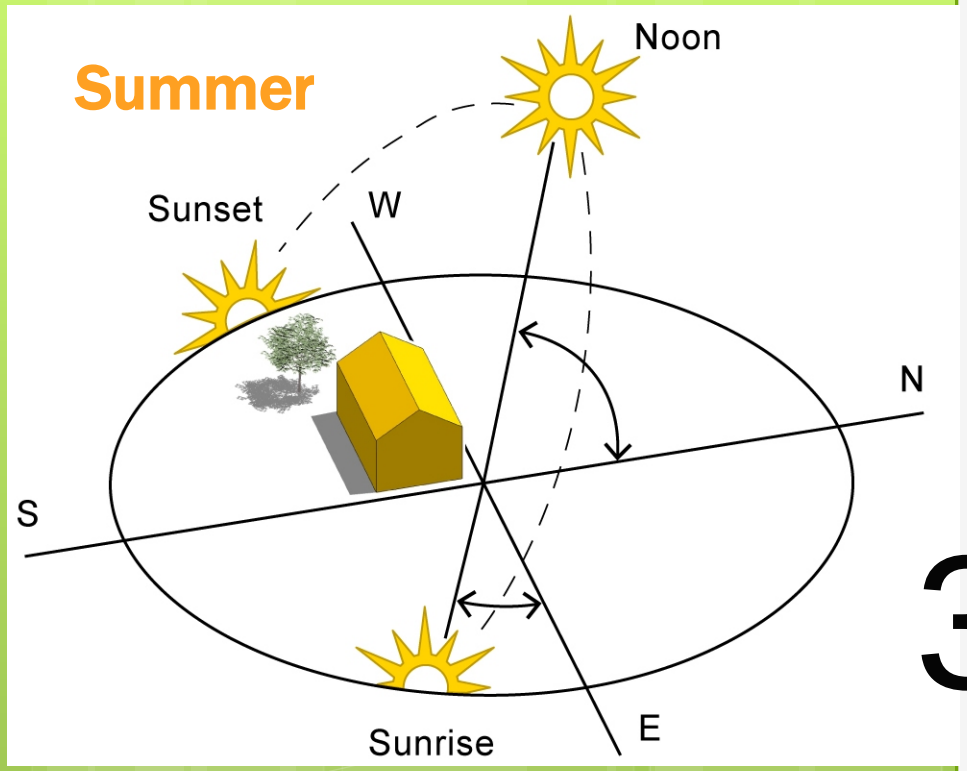
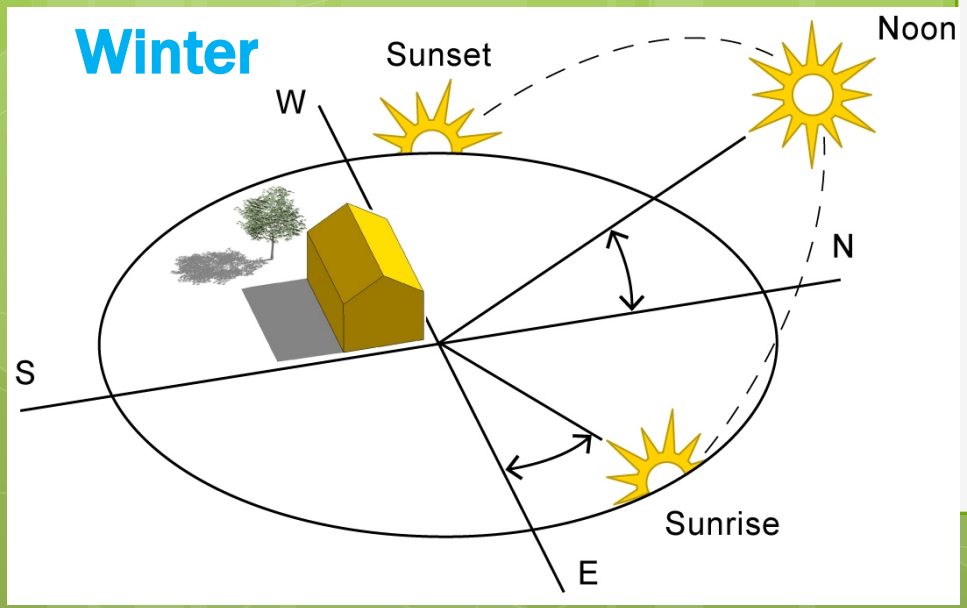
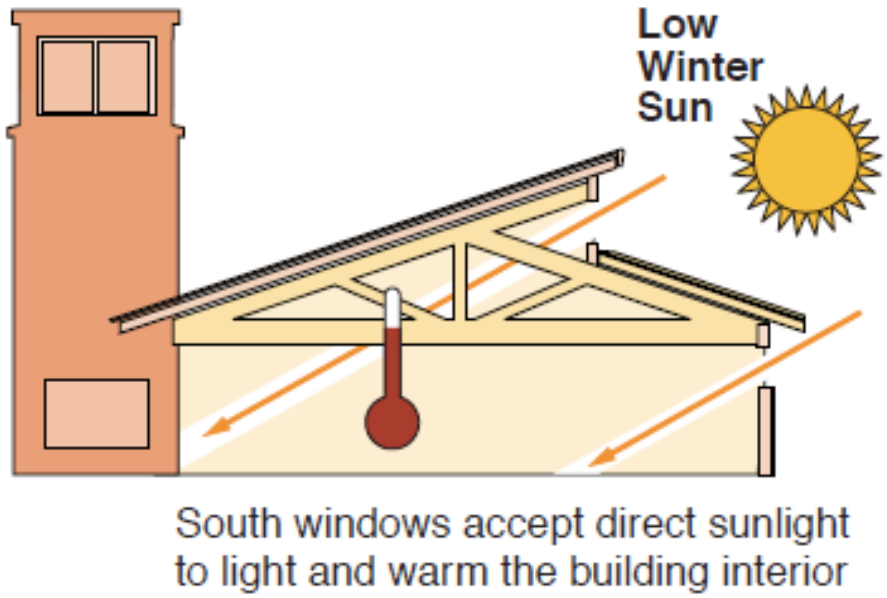
Types of Solar Energy Systems





3 **Passive Solar Design**
Takes advantage of the sun's energy to maximize heating or cooling based on a building's sun exposure

Types of Solar Energy Systems



3

Passive Solar Design

Takes advantage of the sun's energy to maximize heating or cooling based on a building's sun exposure

Types of Solar Energy Systems

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Types of Solar Energy Systems

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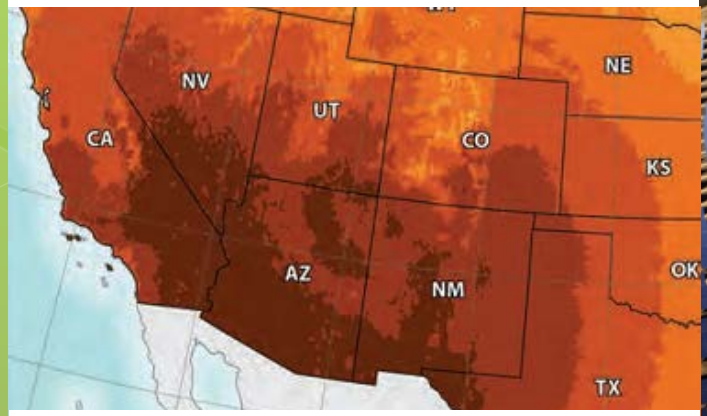
Types of Solar Energy Systems

4 **Concentrating Solar Power** – Uses lenses or mirrors to concentrate a suns energy onto a small area

Feasible only in Southwest



Insolation

Source: National Renewal Energy Laboratory

kWh/m²/Day

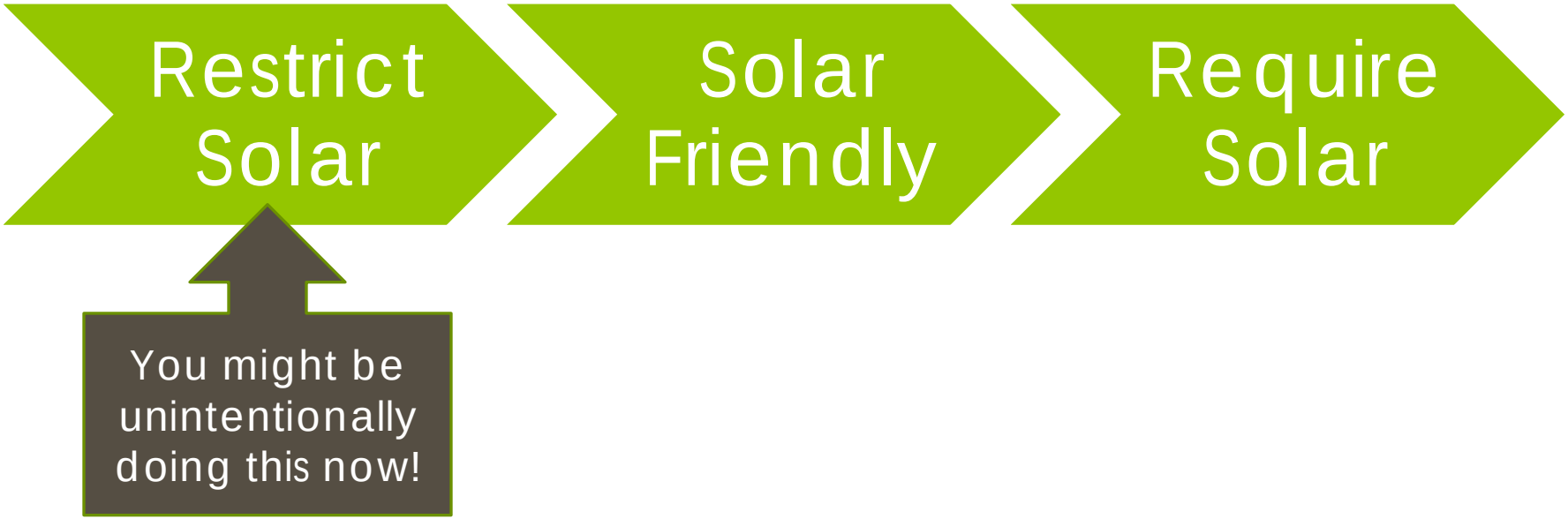
> 65	5.0 to 5.5	3.5 to 4.0
6.0 to 6.5	4.5 to 5.0	3.0 to 3.5
5.5 to 6.0	4.0 to 4.5	< 3.0

Solar Energy and the Comprehensive Plan

Why include Solar Energy in your Comprehensive Plan?

- ✓ Because your comprehensive plan includes extensive public input, you will have **more support** for your solar energy choices.
- ✓ By putting solar energy in your comprehensive plan, you are making it **easier to defend your new ordinances and zoning decisions**.

What is your goal?



Comprehensive Plan

Is Solar part of your comprehensive plan?

Example:

Pinal County, Arizona Comprehensive Plan:

Develop/amend ordinances to protect solar access through sensitive building orientation and for property owners, builders and developers wishing to install solar energy systems.

Solar Friendly

Comprehensive Plan

Is Solar part of your comprehensive plan?

Solar Friendly

Example:

City of Shakopee, MN Comprehensive Plan:

- **Review and modify the zoning ordinance and other relevant city regulations as necessary to remove barriers to the use of solar energy systems and to ensure access to solar energy.** Specific items that should be reviewed include; building heights, building setbacks, performance standards for solar access, site plan review, vegetation controls and incentives.
- **Review and modify zoning and subdivision regulations as necessary to ensure that as many new lots in the city as possible offer proper solar orientation.**

Comprehensive Plan

Is Solar part of your comprehensive plan?

Example:

Pleasanton California Comprehensive Plan:

- Use solar in public facilities and encourage the use of solar in private facilities, where feasible and cost effective.
- For new construction, require roofs that are strong enough and have roof truss spacing to hold photovoltaic panels, where feasible and cost effective.

Solar Friendly → Require Solar

Comprehensive Plan

Is Solar part of your comprehensive plan?

Example:

Jackson County, Oregon Comprehensive Plan:

- Require the use of solar energy to heat swimming pools, except in cases of therapeutic necessity.

Require Solar

Solar Energy and Zoning

Zoning

Factors to consider when addressing Solar in your Zoning Ordinance:

A. System type
B. Size and shape of the system
C. Where energy is used
D. System energy capacity

System Type

Roof or building mounted

System Type

Ground mounted or freestanding

System Type

Building integrated

System Type

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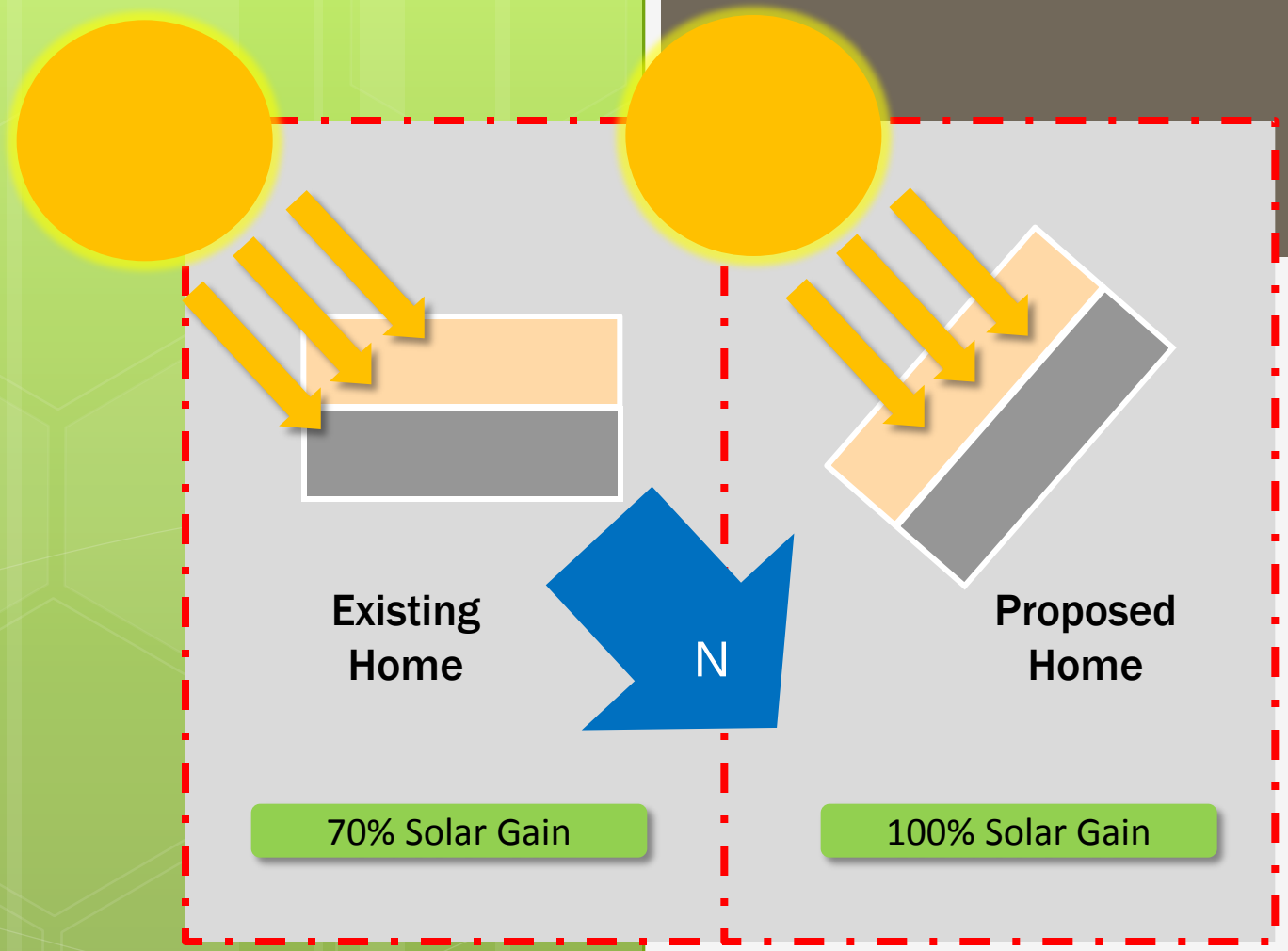
System Type



Building Orientation

System Type

Street Alignment

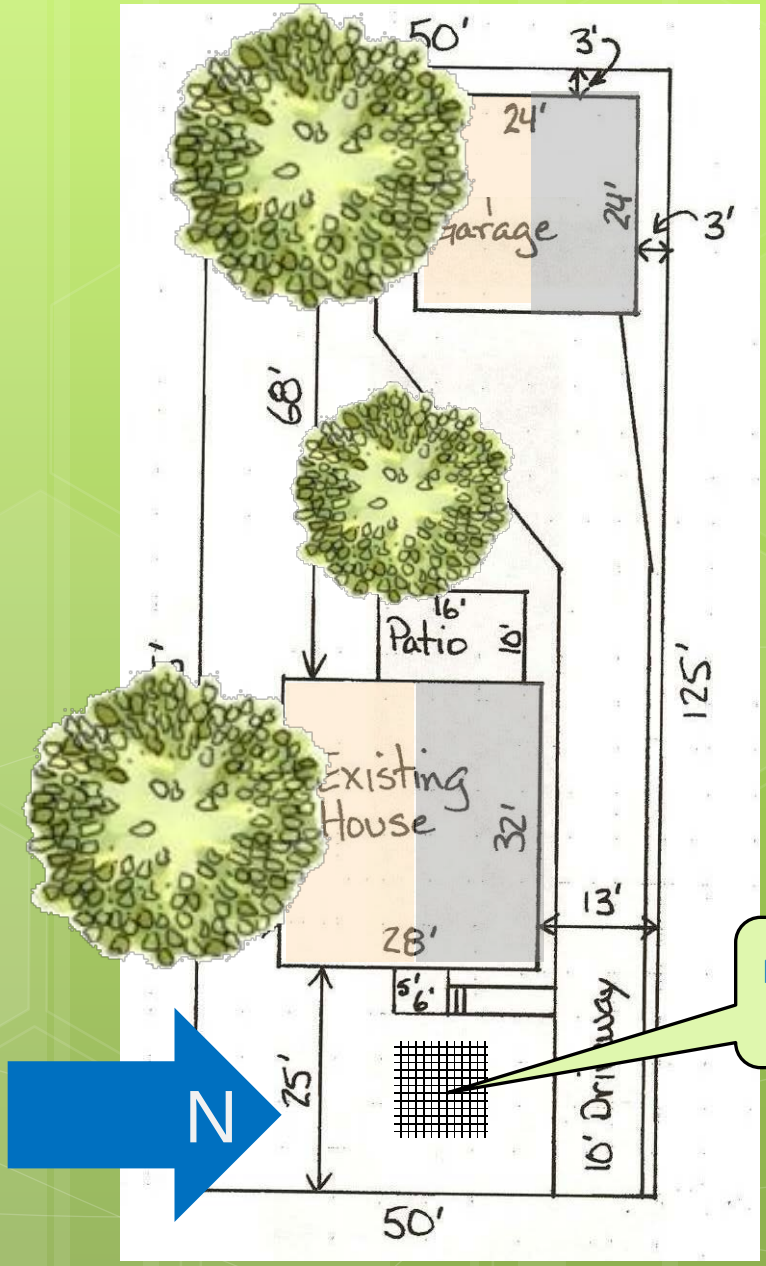
Emporia Kansas Subdivision Regulations

SECTION 4-8 SOLAR ACCESS 4-801.

a. In order to promote the conservation of energy through the use of both passive and active solar systems, **it is suggested that streets in residential subdivision should have an east-west alignment.** Lots intended for detached dwellings should be of sufficient width to allow the structure to be built with its longest axis running east-west.

b. Any subdivider may grant or establish a solar skyspace easement to protect solar energy systems from being shaded. The easements shall be created in writing and shall be recorded on the face of the plat. The easements shall run with the land.

Size and Shape



Setbacks and
Lot Coverage

Size and Shape: Issues to Consider

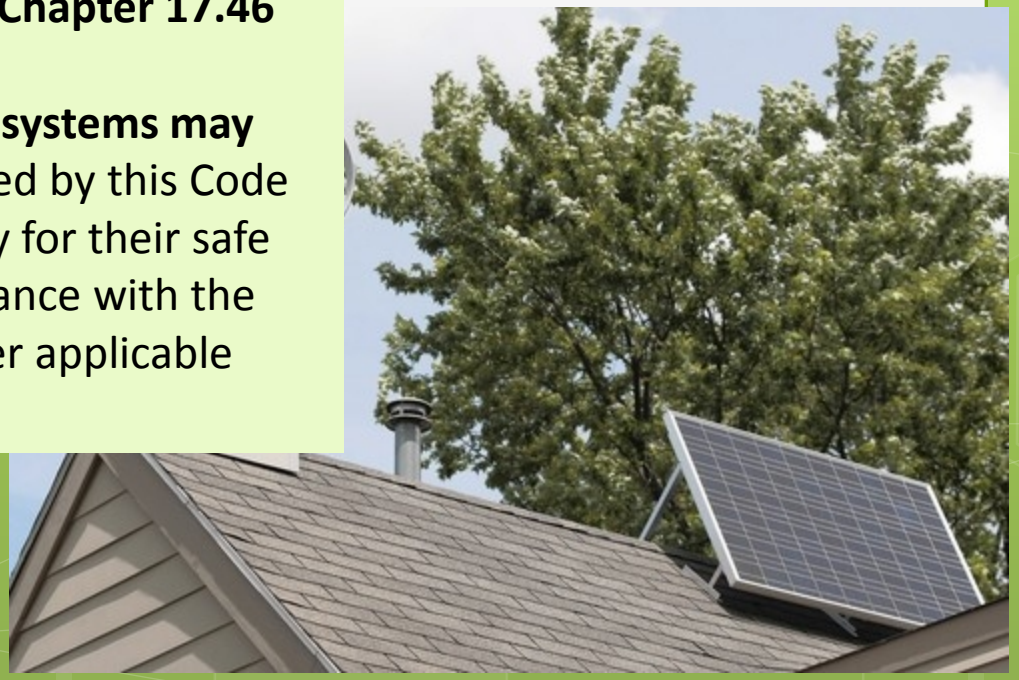
Encourage rooftop over freestanding?

Size and Shape: Issues to Consider

Allow panels to exceed height restrictions, like chimneys, steeples, HVAC units?

Hermosa Beach Municipal Code Chapter 17.46

Solar collectors and **solar energy systems may exceed the height limits** mandated by this Code to the minimum extent necessary for their safe and efficient operation in accordance with the California Building Code and other applicable provisions of state law.



Size and Shape: Issues to Consider

Require screening of non-panel components?

Where Energy is Used

3. Where Energy is Used:

a) On Site

b) Off Site

Solar Energy as an Accessory Use

Impacts of Solar as Accessory Use

Design standards and historical preservation ordinances may prevent the installation of solar panels.

The primary impact of smaller systems is appearance

John Burns, an attorney representing a homeowners association against solar panels in Missouri, stated that, "They are very ugly. You can hardly think they are okay if you look at 'em."

Impacts of Solar as Accessory Use

Owners of a £750,000 listed home told to tear down solar panels that caused 'significant visual impact'

Solar Energy as a Primary Use

Impacts of Solar as Primary Use

Tree and Habitat Loss

Impacts of Solar as Primary Use

Construction Impacts

Impacts of Solar as Primary Use

Storm water runoff from large impervious surfaces

Impacts of Solar as Primary Use

Transmission Infrastructure

Substation for 50MW Solar Farm

Impacts of Solar as Primary Use

Loss of Productive Agricultural Land

Standards for Solar as Primary Use

Solar as Primary Use

Typical Standards for Solar Farms include:

Setback, Screening, and Height limitations

Solar as Primary Use

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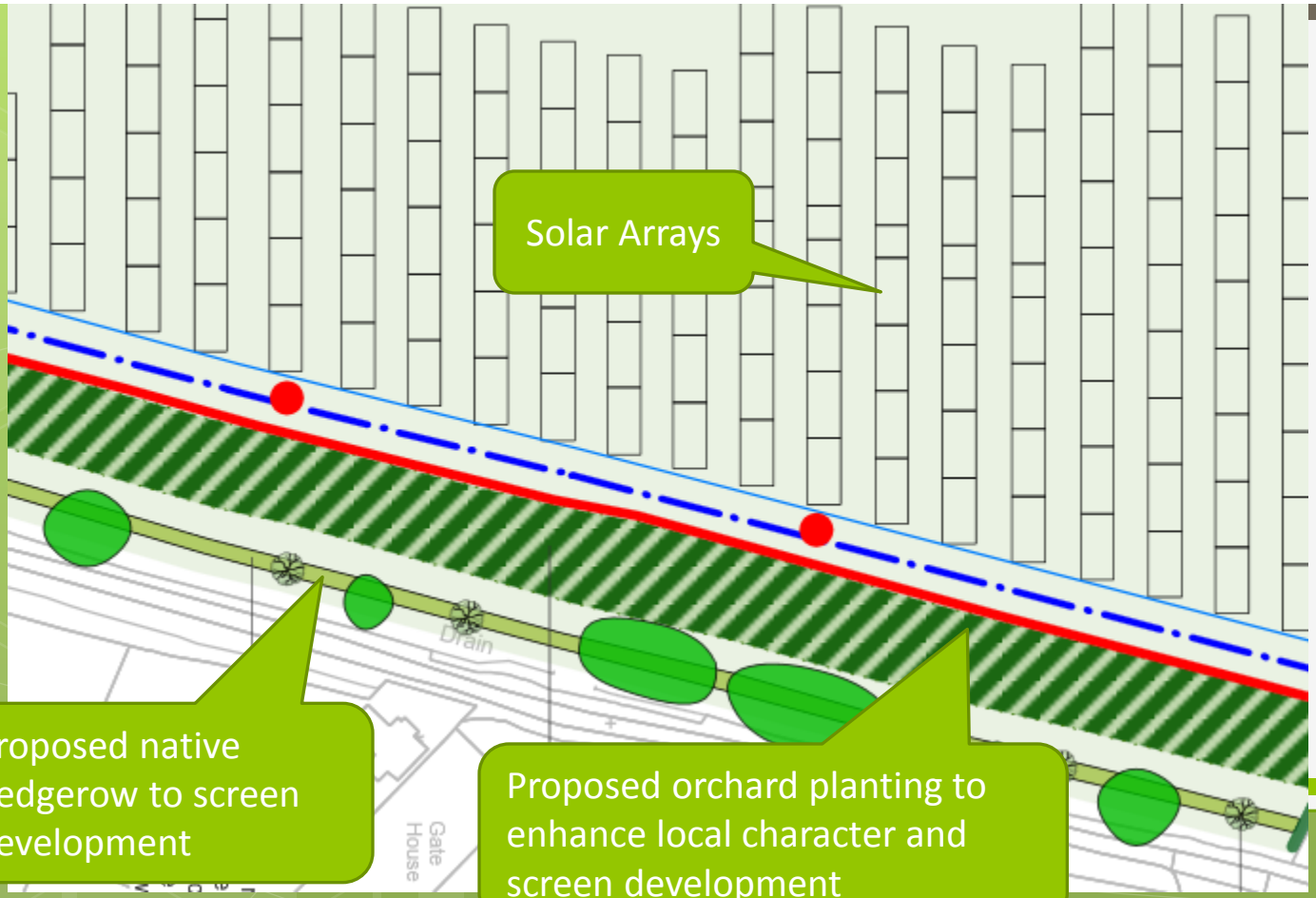
Setback, Screening, and Height limitations



Solar as Primary Use

Typical Standards for Solar Farms include:

Security Fencing

Solar as Primary Use

Typical Standards for Solar Farms include:

Plan for Utility Connections

Solar as Primary Use

Typical Standards for Solar Farms include:

Operations and Maintenance Plan

- ✓ Vegetation Abatement
- ✓ Natural Damage
- ✓ Ground Erosion
- ✓ Shorted Cells
- ✓ Transformer Leaks
- ✓ Broken Conduit
- ✓ Vandalism

Solar as Primary Use

Typical Standards for Solar Farms include:

Restoration to Previous Conditions

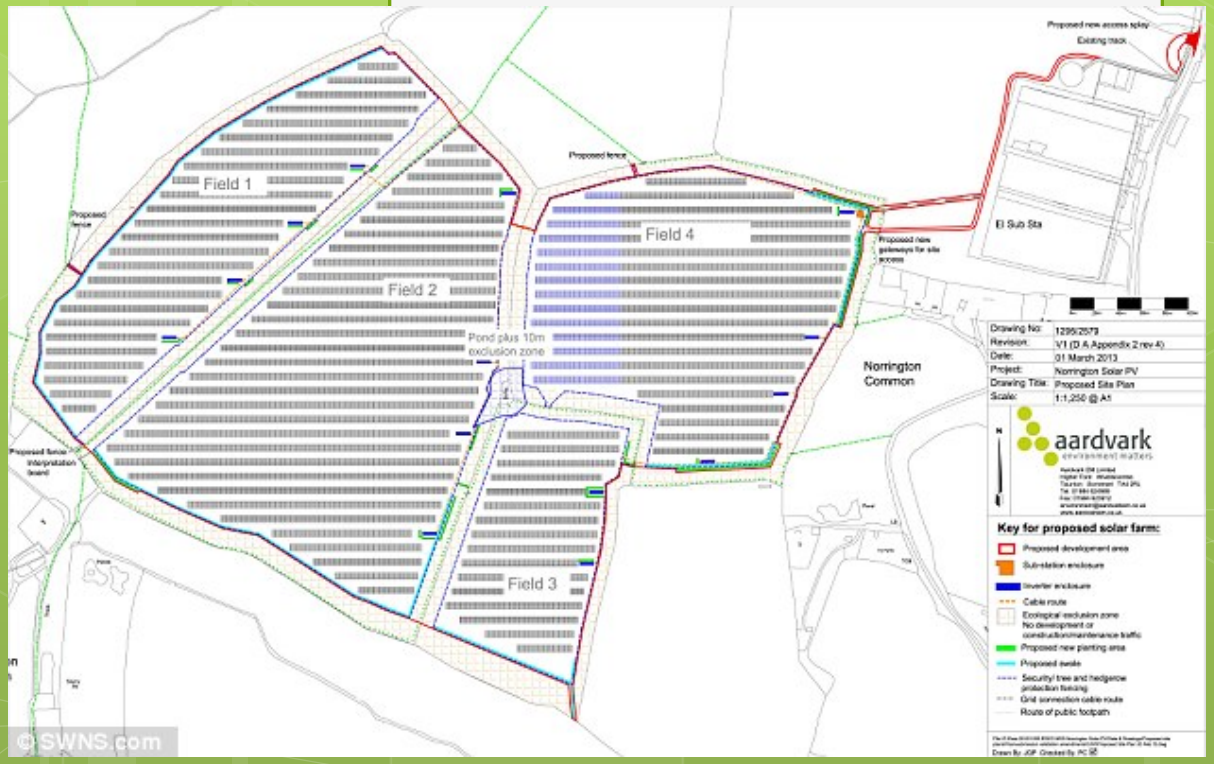
Carrizo Plain was the largest photovoltaic array in the world between 1983 to 1994, producing 5.2 megawatts at its peak.

Especially important on Agricultural Lands

Solar as Primary Use

Typical Standards for Solar Farms include:

Site Plan Review vs. Permitted as a Right



Capacity of the Solar Energy System

Capacity

4. Energy Capacity:

Example:

Worcester County, MD:

Large solar energy systems:

200kW or greater

Medium systems:

Greater than 5kW but less than 200 kw

Small systems:

Less than 5kW

Capacity

4. Energy Capacity:

Columbia University Model Ordinance:

Small-scale solar is defined as:

Example:

- ✓ Photovoltaic Systems that produce up to 10 kW per hour, or
- ✓ Solar-thermal systems that serve the building to which they are attached and do not provide energy to other buildings

Capacity

4. Energy Capacity:

Croton-on-Hudson, NY:

Example:

Small-scale solar is defined as:

- ✓ Photovoltaic Systems that produce up to 12 kW per hour, and
- ✓ Are roof-mounted (among other requirements)

Small-scale solar has streamlined permitting

Capacity

4. Energy Capacity:

Example:

New York State Unified Solar Permit

Expedited Solar Permit Process for Small-Scale Roof-Mounted Residential and Commercial Solar Electric

To determine if you are eligible for the expedited permitting process, answer the questions below.

Yes No 1. Solar installation has a rated capacity of **12 kW or less**.

Yes No 2. Solar installation is not subject to review by an Architectural or Historical Review Board.

Yes No 3. Solar installa… permit.

Yes No 4. Solar installa… accessory s… connection…

Yes No 5. Solar installa…

Yes No 6. Solar installa…

Yes No 7. The Solar In… jurisdiction and the State.

Yes No 8. The proposed equipment is permitted by code and equipment meets all relevant certification standards.

Yes No 9. The solar electric system and all components will be installed per the manufacturer's specifications. **[more]**

NY Unified Solar Permit

Creates a standard permit for all NY Municipalities

Meant to save time for installers

Give consistency for small solar projects

http://ny-sun.ny.gov/

Protecting Solar Access

Protecting Solar Access

Solar Easements

- Negotiated between neighbors.
- Voluntary
- Between private parties
- Least contentious
- May be less protective

Protecting Solar Access

New York's Solar Energy Easement Law:

(Real Property Law § 335-B)

- Solar energy easement are required at a minimum to contain:
  - Easement location and orientation
  - Any terms for granting or termination, and
  - Any provision for compensation in the event that interference occurs

- The New York General City, Town, and Village codes also allow local zoning districts to make regulations regarding solar access that provide for "the accommodation of solar energy systems and equipment and access to sunlight necessary therefor..." The stated intent of the authorizing legislation recognizes "access to solar energy as a valid public purpose within the zoning authority of local governments...".

Protecting Solar Access

Solar Access Permits – Property owners with installed systems get a permit from the municipality which then protects against "impermissible interference"

Protecting Solar Access

Wisconsin solar access permitting:

Example:

- Municipality grants a solar access permit to a solar system property owner.
- Protects the solar system owner from future shading from a new structure or new vegetation on a neighboring property.
- Neighboring property owners must notified of the pending permit before a permit can be granted.
- Any impacted neighbor can request a hearing to adequately review the merits of the permit.

Installation and Decommissioning

Installation

- Solar panels are subject to weather and high temperatures
- Installation is a specialty trade
- Do you require certified installers?

Installation

Certified Installers

http://ny-sun.ny.gov/For-Installers/Eligibility-and-Training

Requirements for Eligible Installers/Contractors
(Residential and Small Commercial <200kW)

To qualify to participate as an **Participating Installer**, an individual must have fulfilled one of the three credentialing paths detailed below as well as meet the additional NY-Sun participation requirements.

Participation Requirements

OPTION 1: NABCEP Certification (North American Board of Certified Energy Practitioners) PV Installation Professional Certification

OPTION 2: IBEW-NECA Electrical Journeyman & Apprentice Training (International Brotherhood of Electrical Workers and National Electrical Contractors Association)

OPTION 3: UL (Underwriters Labs) PV System Installation Certification

Decommissioning

A panel manufactured today should produce 92% of its original power after 20 years – *Engineering.com*

Do you require decommissioning if panels no longer function or are no longer desired?

Do you require special handling of panel disposal?

Decommissioning

There are no special disposal requirements in New York

Panels will be accepted at the Broome County Landfill if they pass a *Toxic Characteristic Leaching Procedure (TCLP)* test showing that they are not hazardous waste

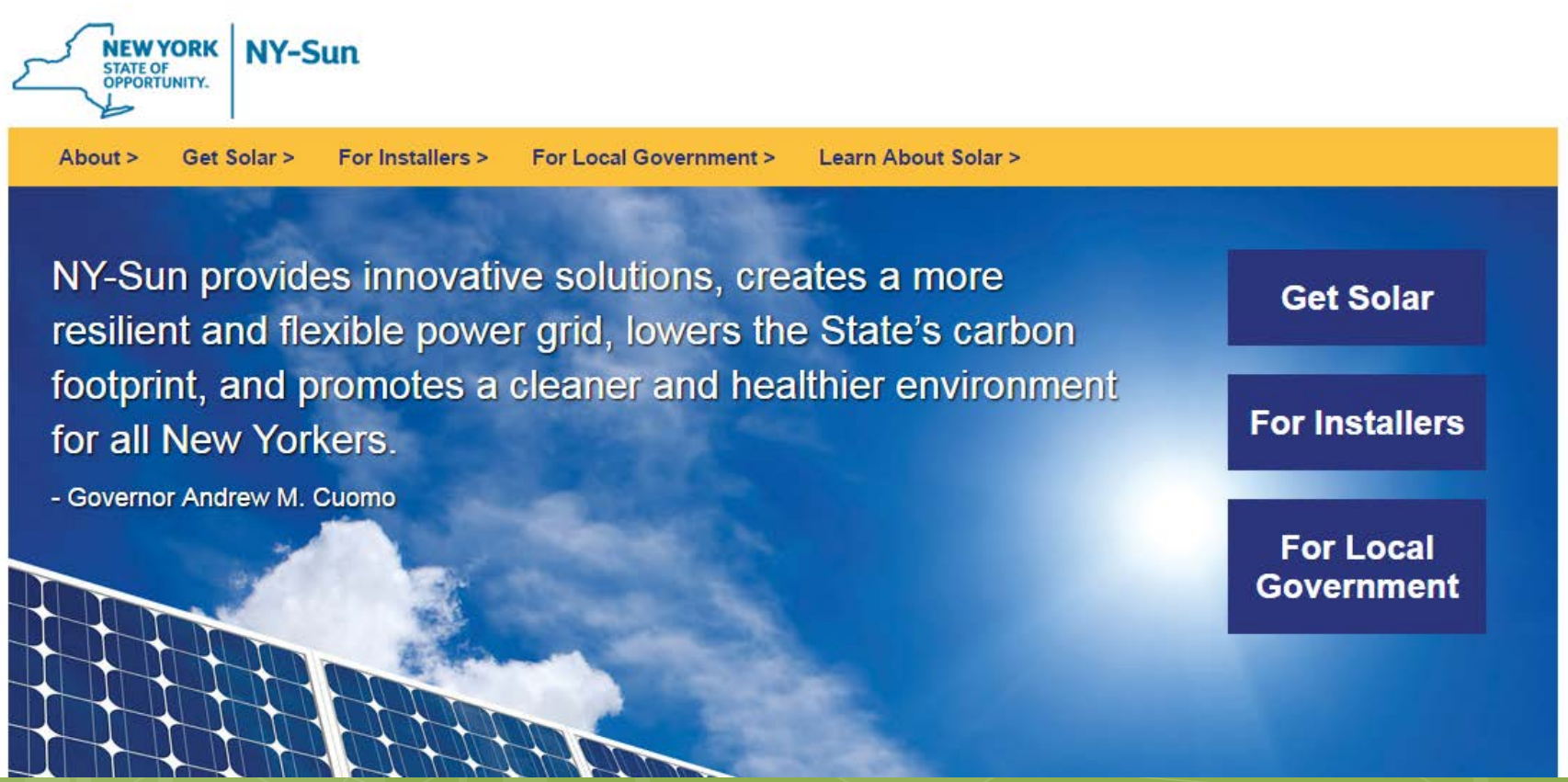
Many manufacturers are now offering end-of-life services when they install arrays.

Additional Resources

Resources

Guide to Solar Incentives, Installers, and Local Government Resources

http://ny-sun.ny.gov/



Resources

Zoning for Solar Energy: Resource Guide
NY-Sun PV Trainers Network
https://training.ny-sun.ny.gov/images/PDFs/Zoning_for_Solar_Energy_Resource_Guide.pdf

Model Small-Scale Solar Ordinance – Columbia Law School
http://web.law.columbia.edu/climate-change/resources/model-ordinances/model-small-scale-solar-siting-ordinance

Siting Solar Panels under the Zoning Laws of New York State
by Charles Gottlieb and Emily Ekland
http://www.albanylaw.edu/glc/about/expertise/renewable/Documents/Siting%20Solar%20Panel%20Under%20NY%20Zoning%20Laws3.pdf

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