Planning and Zoning for Solar Gardens

(S545)

APA's 2015 National Planning Conference

Monday, April 20, 2015

9:00-10:15 AM

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Learning Objectives

- Describe different models of community-scale solar projects
- Identify specific regulatory barriers to shared solar projects
- Evaluate alternative approaches to sanctioning solar gardens through local plans and development regulations

SunShot Solar Outreach Partnership

The SunShot Solar Outreach Partnership (SolarOPs) is a U.S. Department of Energy (DOE) program designed to increase the use and integration of solar energy in communities across the United States.

http://solaroutreach.org

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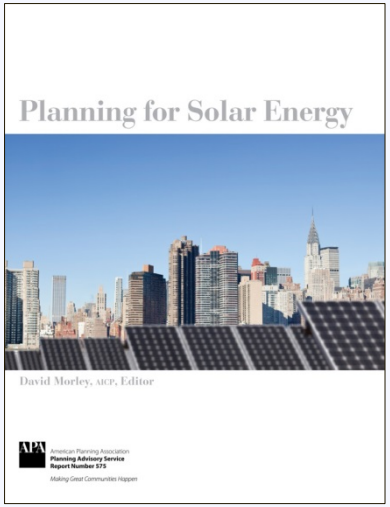
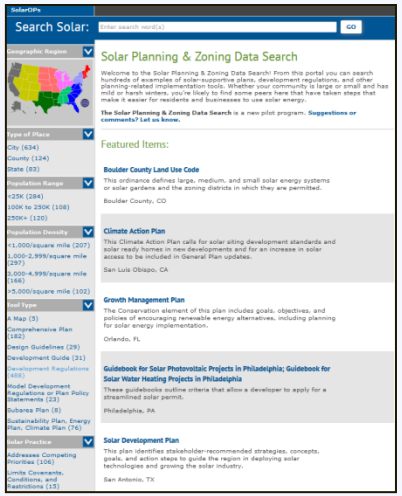
Key APA Resources

- Planning for Solar Energy (PAS 575): www.planning.org/store/product/?ProductCode=BOOK_P575



- Solar Planning and Zoning Data Search: www.planning.org/solar/data/



Our Presenters

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Project Leader

National Renewable Energy Lab (NREL)

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Senior Research Associate

American Planning Association

Cameron Gloss, AICP

Planning Manager

City of Fort Collins, CO

What Is a Solar Garden?

Solar Garden:
Any freestanding solar energy system on a small parcel of land (e.g., 10 acres or less) that provides power to one or more, off-site, local uses or utility customers.

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Image courtesy of www.brewstercommunitysolargarden.com

Why Are Solar Gardens Important?

- Allows renters and lower income residents to participate.

Why Are Solar Gardens Important?

- Solves the problem of limited usable rooftop space.

Why Are Solar Gardens Important?

- Can minimize conflicts with tree protection, historic preservation, and densification.

Why Are Solar Gardens Important?

- Can provide an alternative use for vacant land.

Community Solar – Structures, Barriers, and Leaders

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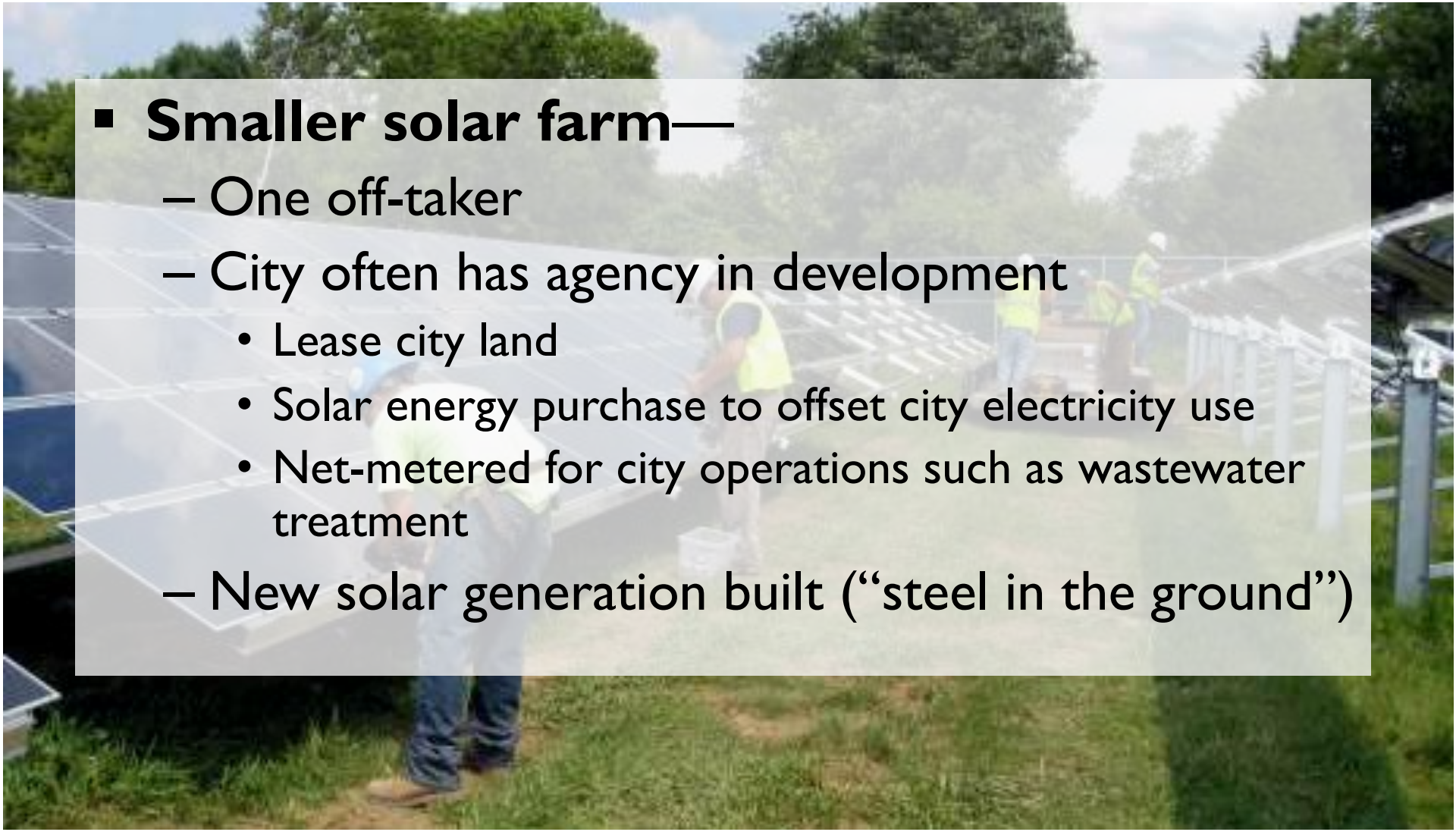
VoteSolar Project: http://www.sharedrenewables.org/

Solar Garden Attributes

- **Expands consumer access to solar energy**
  - Participants own or lease panels, or purchase kWh blocks of generation
  - Participants directly receive a tangible economic benefit on their electricity bills
  - New solar generation is built

The Vote Solar Initiative

Community-Scale Solar



- **Smaller solar farm—**
  - One off-taker
  - City often has agency in development
    - Lease city land
    - Solar energy purchase to offset city electricity use
    - Net-metered for city operations such as wastewater treatment
  - New solar generation built ("steel in the ground")

Source: juwi solar

What Community Solar is Not

Group Purchase of Solar (Solarize)

- Community or neighborhood group purchase of individual rooftop systems. (Many People Many Systems)

Solarize SOUTH CAROLINA

http://www.solarizesc.org/

Community Investment Model (Crowdfunding)

- Creating access for individuals to invest in solar projects.
  - Solar bonds from SolarCity
  - Solar Mosaic (joinmosaic.com)

Green Pricing Programs (although it can look similar at times)

- Utility customers pay extra to purchase or support electricity produced from renewables sources.
- Not necessarily local or tied to a specific installation

TVA Green Power Switch

Solar Garden Project Structures

PV System

Solar Developer

Utility

① Developer builds, owns project, delivers electricity to Utility under **PPA**

② Utility structures community solar program around purchased output from PV system

③ Utility customers enroll in program

Photos and graphics from NREL and Microsoft

Solar Garden Project Structures

PV System

Solar Developer

② Developer builds, owns project, delivers electricity to Utility

Utility

① Developer collects subscriptions from participants/subscribers (escrowed until project completion)

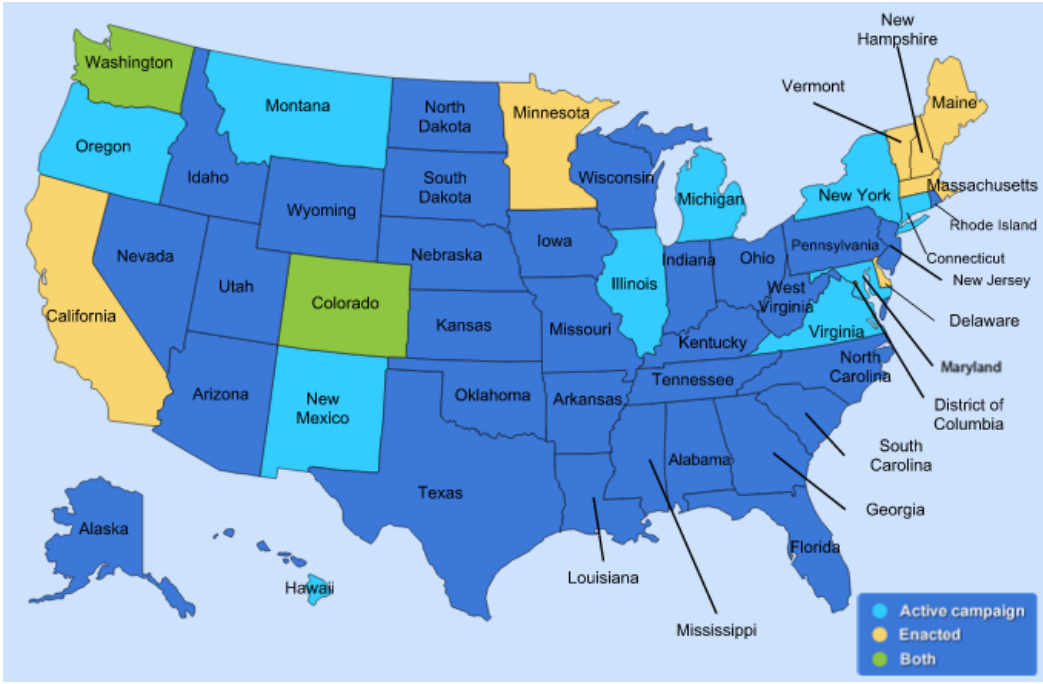
③ Utility credits subscriber accounts (electricity and possibly SRECS)

Photos and graphics from NREL and Microsoft

Utilities of all Types Involved

- Investor Owned Utilities
  - Xcel Energy
  - Tucson Electric Power
- Municipal Owned Utilities
  - Orlando Utility Commission
  - SMUD (Sacramento)
  - Seattle City Light
- Electric Cooperatives
  - Many in Colorado

10 states have shared solar policies



Why? Responding to interest from customers, RPS compliance and/ or part of overall solar program.

Average Program Size by Type of Energy Service Provider

Coop – 250 kW

Muni – 432 kW*

* Excluding SRP 20-MW program

IOU – 3300 kW

Community Solar Subscribers

Subscriber Perspective

- Subscribers may make an one time up-front payment or on-going monthly payments.
- Capacity (kW) or Production Based (kWh) subscriptions
- Financing may be available
- Subscriber's utility bill will reflect participation in project in various ways
- Usually transferable (to a new address or to a new subscriber)
- **Virtual net metering (VNM)**—off-site, multiple customers, multiple meters

Sample Pricing

Capacity or Production Based Pricing

- $780 per solar panel
- $3.15/Watt
- $3.00 per 150 kWh per month (TEP)
- $0.13/kWh (Orlando)

Winthrop Community Solar Project. *Photo by Ellen Lamiman, Energy Solutions*

Regulatory Barriers

State/Federal

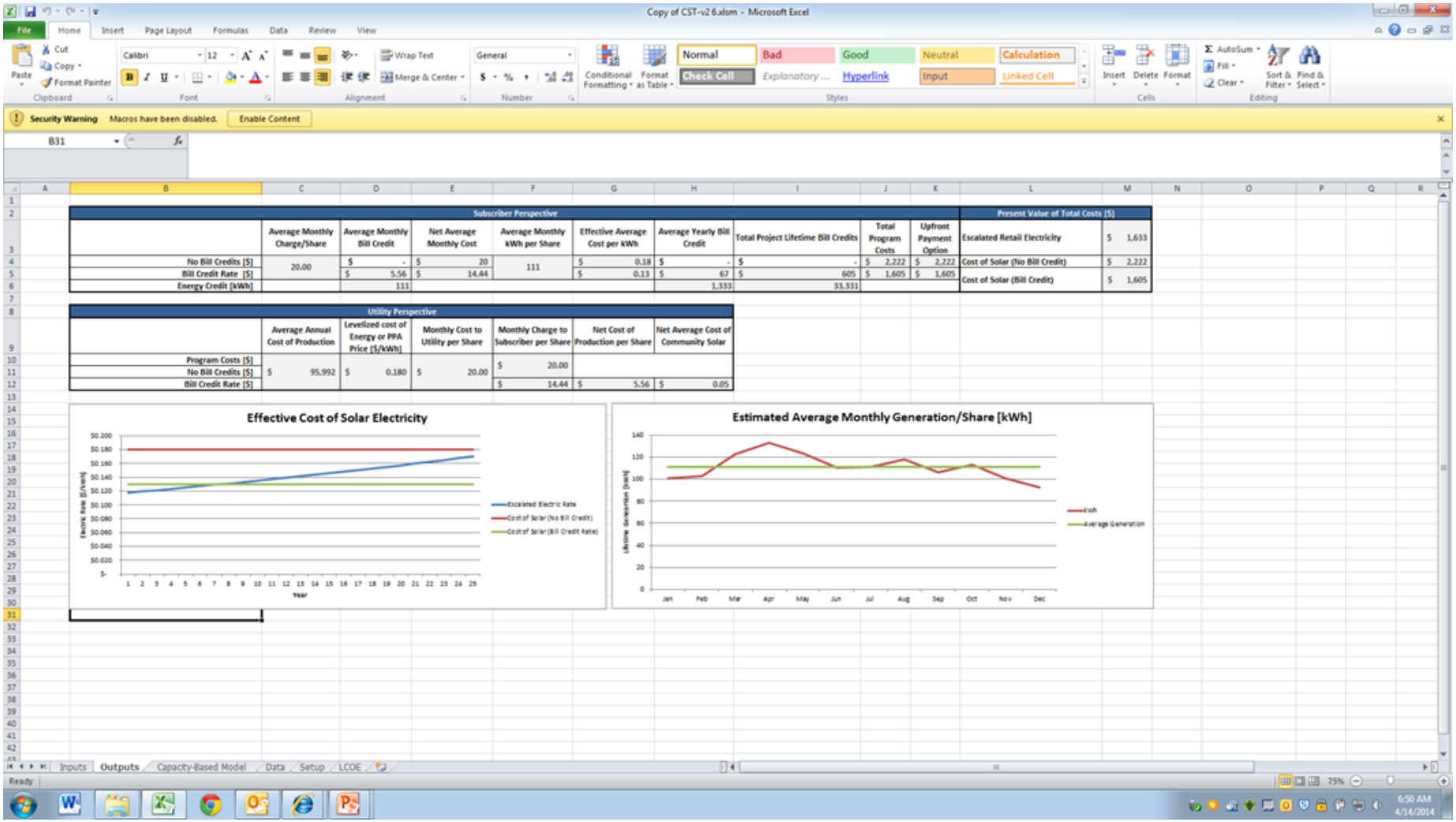
- Virtual net metering not allowed
  - CA, DE, MA, ME, MN, NH, VT have legislation allowing for VNM
- Net metering caps
  - 24 states have caps on total net metered capacity, 5 nearing cap
- Net metering regulations that limit project size or participant class
- Interconnection policy
- Securities compliance
  - Cannot sell "shares" or regulated by the Securities Exchange Commission

Local/Utility

- Community-scale solar land use restricted by municipality
- High property tax assessment
- Utility does not offer shared solar

Photo : SunShare, LLC

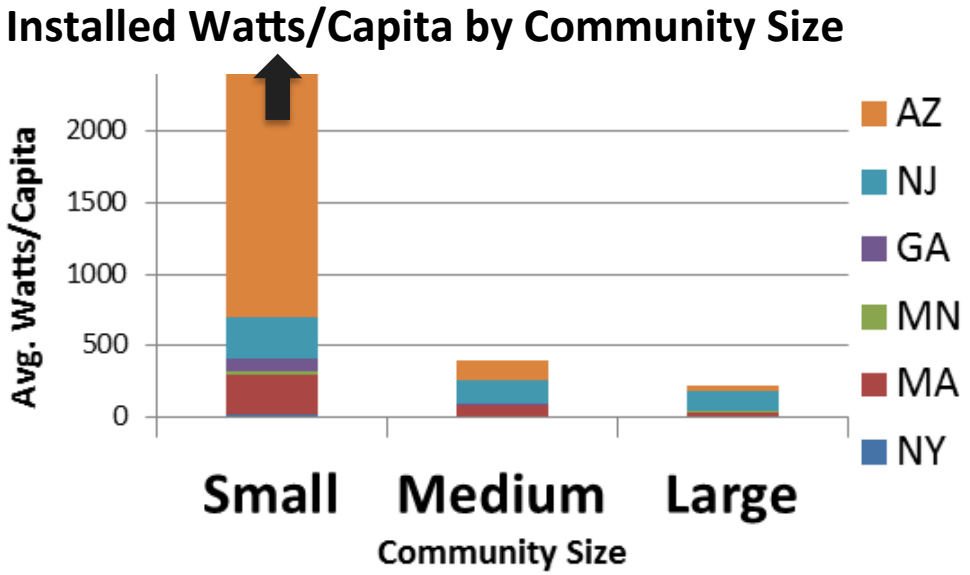
Community Solar Scenario Tool

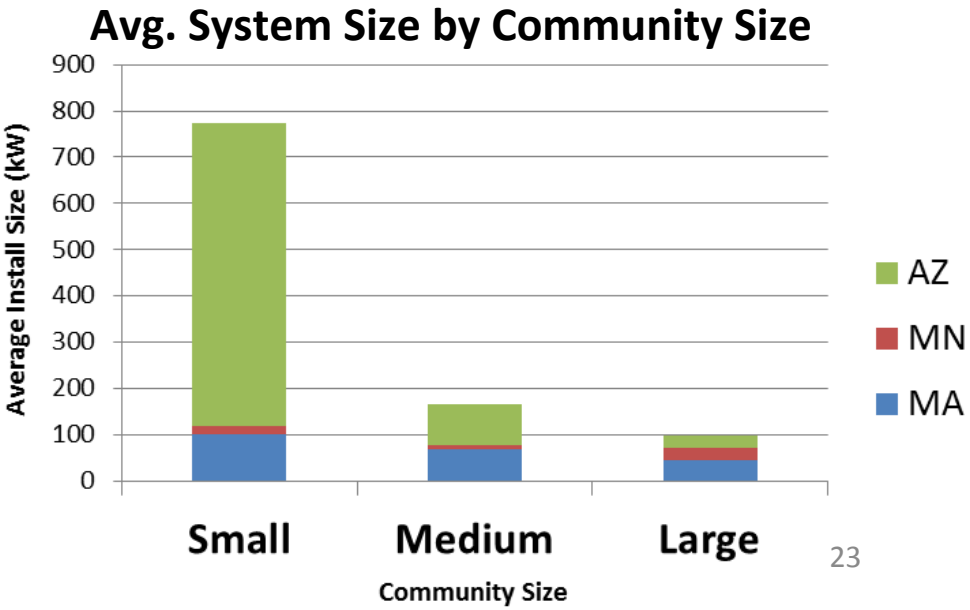


http://www.nrel.gov/tech_deployment/tools_community_solar.html

Community-Scale Solar Drives W/Capita

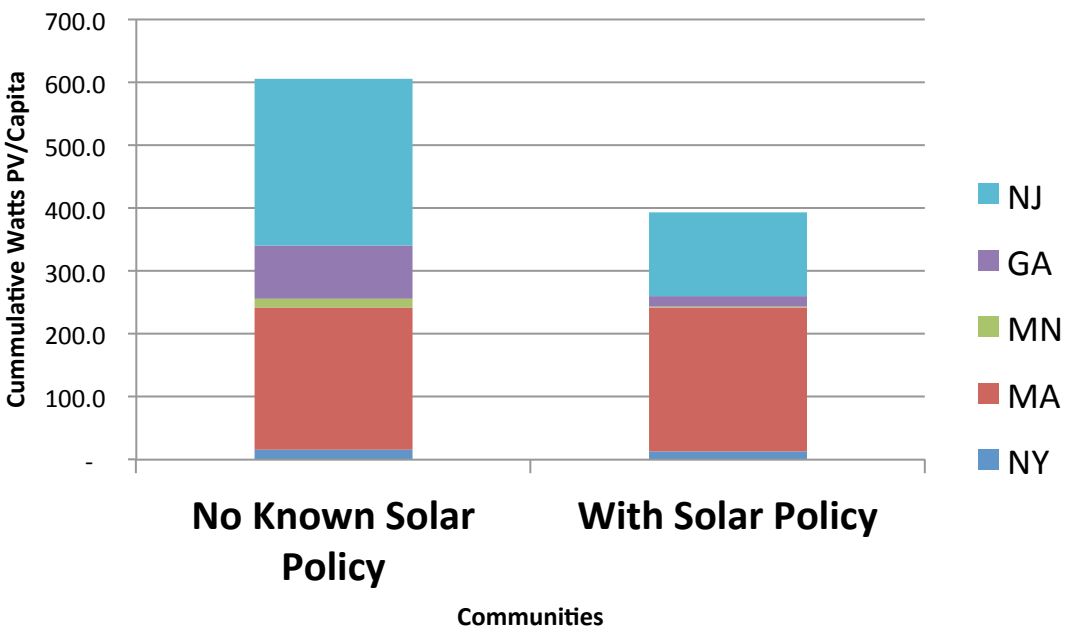
- Smaller communities have higher amounts of solar installed per capita
- Smaller communities tend to have larger, ground mount systems and far fewer rooftop systems
  - Each of the 50 MA communities with the most PV have at least one install >500 kW (avg. pop. 34k)





Solar and Planning Policies

- Adopting solar planning policies and codes does not directly correlate with more installed solar
- Data Sources:
  - APA SolarOPs Solar Planning & Zoning Data Search (most are development regulations)
  - State PV installation data and 1603 U.S. Treasury data



Moving Forward: What Can I Do?

At the local level

- Propose a shared solar program to your utility
- Offset city energy use with community-scale solar
- Develop solar-friendly property tax policies
- Offer other tax and financial incentives
- Streamline local permitting processes for solar
- Eliminate or refine other local policies that discourage solar
  - Restrictive siting rules
  - HOA rules based on aesthetics

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April 20, 2015

NREL

NATIONAL RENEWABLE ENERGY LABORATORY

Supporting Solar Gardens Through Land-Use Planning

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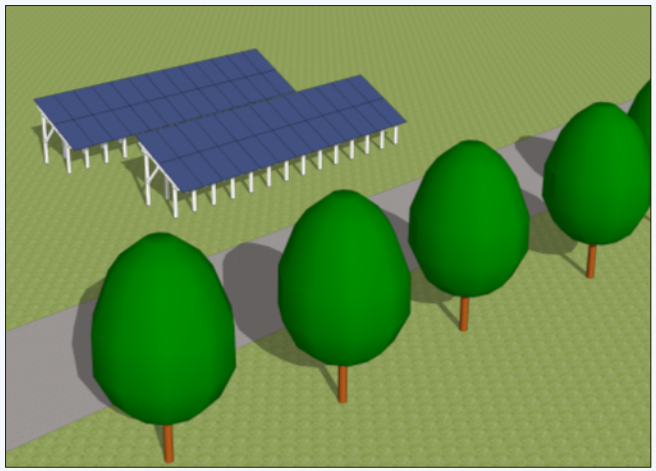
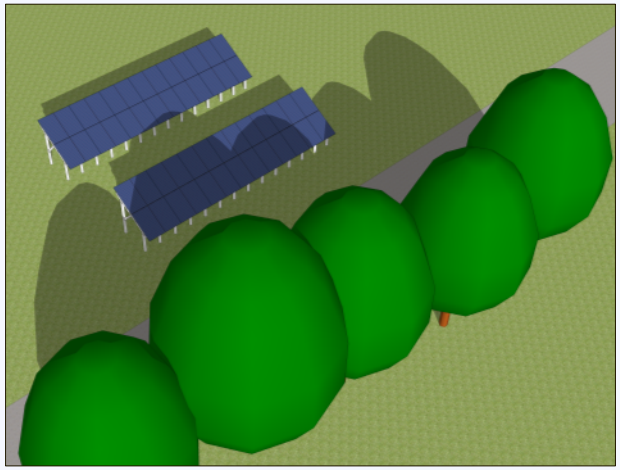
Identify Appropriate Locations

- Photovoltaic (PV) systems need unobstructed access to sunlight.
  - Freestanding systems increase siting options.
  - But, they are more vulnerable to future obstructions.



Year 0 = No shading



Year 20 = Major shading

Identify Appropriate Locations

- PV systems are modular.
  - Community-scale solar installations may take up a fraction of an acre or multiple acres.
  - But, there are economies of scale.

PSE&G Trenton Solar Farm, 1.3 MW on about 5.5 acres

Identify Appropriate Locations

- Consider land-market supply and demand.
  - Some cities and counties have abundant space.
    - Legacy cities with weak market demand for surplus vacant properties
    - Rural townships and counties
  - Others have few suitable locations.
    - Built-out cities with high demand for new housing and office space

Add Goals and Policies to Local Plans

- Village of Altamont, NY
  - Encourage and offer incentives for cooperative sharing of residential solar power. (2006 Comprehensive Plan, Objective 5.1.iv)

- Town of Andover, MA
  - Look to Solar Energy Community Projects which are an approach to supplying a community with its energy requirements from renewable energy or high-efficiency cogeneration energy sources. (2012 Master Plan, LU.6.1)

Add Goals and Policies to Local Plans

- City of Lake Forest Park, WA
  - In conjunction with Seattle City Light, establish and promote community solar projects, spearheaded by the City, in which private citizens can invest. Encourage the city to be a role model in promoting public and private pilot projects with the active participation of residents and businesses. (Draft 2015 Comprehensive Plan, Sustainable Alternative Energy Policy)

- Town of Unity, ME
  - Create a community solar energy resource for homes and businesses in Unity, and possibly with the immediate region when economical. (2014 Comprehensive Plan, Strategy 8c-2)

Remove Zoning Barriers

- Potential Barrier 1: Regulatory silence

Remove Zoning Barriers

- Potential Barrier 2: Explicit prohibition

TABLE OF PERMITTED USES									
	P = Permitted; C=Conditional Use; A=Accessory Use Only								
	Residential Districts		**Mixed-Use Districts**			**Commercial Districts**		**Industrial Districts**	
Use	R-1	R-2	MX-1	MX-2	CBD	NC	GC	LI	HI
solar energy system	A	A	A	A	A	A	A	A	A

Remove Zoning Barriers

- Potential Barrier 3: A lack of nuance

TABLE OF PERMITTED USES									
	P = Permitted; C=Conditional Use; X=Prohibited								
	Residential Districts		Mixed-Use Districts			Commercial Districts		Industrial Districts	
Use	R-1	R-2	MX-1	MX-2	CBD	NC	GC	LI	HI
accessory solar system	P	P	P	P	P	P	P	P	P
solar farm	X	X	X	X	X	X	X	C	P

Establish Use Permissions

- Define solar gardens as a distinct use.

Community Solar Garden: A solar-electric (photovoltaic) array that provides retail electric power (or a financial proxy for retail power) to multiple community members or businesses residing or located off-site from the location of the solar energy system, under the provisions of Minn. Statutes 216B.1641 or successor statute. (City of Rosemount, MN)

Solar Garden: Groupings of solar photovoltaic solar panels connected to an electric circuit served by an electric utility company. Multiple users may subscribe to receive the output from one or more panels, receive the benefits of PV technology and the efficiencies associated with a larger-scale project without having to own, host or maintain the equipment on their own property. (City of New Richmond, WI)

Establish Use Permissions

- Define solar gardens as a distinct use.

Medium Solar Energy System: A Solar Energy System that is at least one (1) acre in size but less than five (5) acres in size. (Jackson Township, OH)

Medium Solar Energy System: shall mean a private on-site or utility-scale solar energy conversion system consisting of many ground–mounted solar arrays in rows or roof panels, and associated control or conversion electronics, occupying more than one-half acre and no more than 10 acres of land, and that will be used to produce utility power to on-site uses and off-site customers. (Casco Township, Michigan)

Establish Use Permissions

- Add solar gardens to permitted use tables.

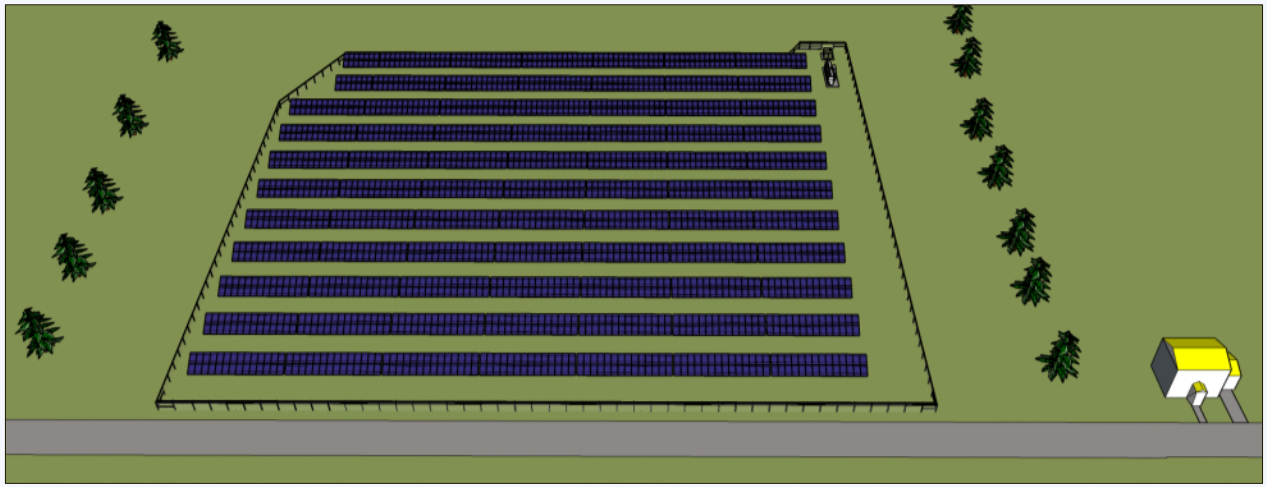
TABLE OF PERMITTED USES									
	P=Permitted; C=Conditional Use; X=Prohibited								
	Residential Districts		Mixed-Use Districts			Commercial Districts		Industrial Districts	
Use	R-1	R-2	MX-1	MX-2	CBD	NC	GC	LI	HI
accessory solar system	P	P	P	P	P	P	P	P	P
solar garden	P	P	P	P	C	C	P	P	P
solar farm	X	X	X	X	X	X	X	C	P

OR

TABLE OF PERMITTED USES										
	P=Permitted; C=Conditional Use; X=Prohibited									
	Residential Districts		Mixed-Use Districts			Commercial Districts		Industrial Districts		Additional Standards
Use	R-1	R-2	MX-1	MX-2	CBD	NC	GC	LI	HI	
accessory solar system	P	P	P	P	P	P	P	P	P	§12.225.030
primary solar system	P	P	P	P	C	C	P	P	P	§12.225.040

Establish Use Permissions

- Adopt appropriate use-specific standards.
  - Minimum lot size
  - Setbacks, lot coverage, height
  - Screening
  - Decommissioning



Sketchup model of 500 kW system on 2.5 acres by Renewable Energy Associates LLC

Review Development Fees

- For permitting and review fees, weigh true costs of review against community benefits
- For impact fees, consider community impacts of solar gardens
  - Generate few traffic trips
  - Minimal demand for public safety services
  - Generate no students

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Solar Outreach Partnership: solaroutreach.org

APA's SolarOPs resources: www.planning.org/research/solar/

Fort Collins Solar Code

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Colorado Legislation

- Community Solar Gardens Act
  - HB1342 approved 2010
    - 2 megawatts (MW) or less
    - Located in or near a community
    - Includes "subscribers" – retail customer who owns a subscription to the power generated. Subscribers own a "share"
- Limitation on Solar Development Review Fees
  - HB11-1199/CRS 30-28-113
    - All solar less than 2 MW
    - Limits all permit and development review fees
      - $500 residential
      - $1,000 commercial

Fort Collins Solar Power Purchase Program (FCSP^3)

- Target is 5 megawatts of new solar
- Commercial Customers only
- PV systems 10 to 1000 kW
- 20 year purchase contracts
- Program rolled out 3rd Quarter 2013

Fort Collins Small Solar Rebates

2015 Rebates through net metering:

- Residential $1/Watt up to 3 kW
- Commercial $1/Watt up to 20 kW
- Rebates on a first-come-first-served basis.

WWW.FCGOV.COM / SOLAR-REBATES

Fort Collins Community Solar Garden

- RFP process for third-party operator
- In phase 2 of the program

Fort Collins Solar Code

- Acknowledge that solar collectors are a visible symbol of our commitment to sustainability.
- Draw no regulatory distinction between where electricity is produced or received.
- Integrate solar collectors into architectural form.
- Scale solar generation standards based on the amount of land coverage not the power generated.

Target the Use of Residual Lands

- Use lands not suitable for productive urban use, e.g.- abandoned RR right-of-way

Solar Sculpture Park Proposal – Fort Collins, CO
Image courtesy of urban|rural design

Consider in Low Rise Flood Areas

- PV Systems can be an appropriate use in shallow flood plains not suitable for residential development

Valmont Solar Garden – Boulder, CO
Image courtesy of Clean Energy Collective

Solar Facility Aesthetics

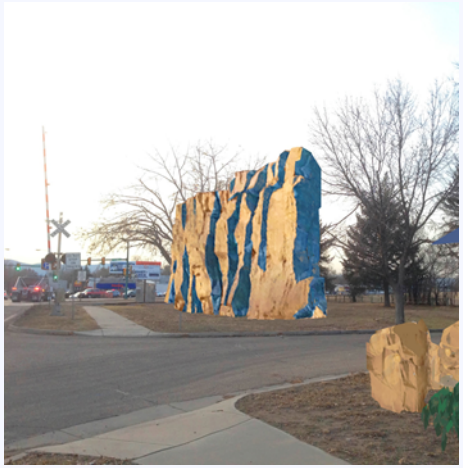
- Materials, colors and textures for the solar support structure complement site context
- No barbed/razor wire
- Place ancillary solar equipment inside a building or screened from public view
- Integrate art

Solar carport structure and colors match building architecture

Solar Facility Aesthetics

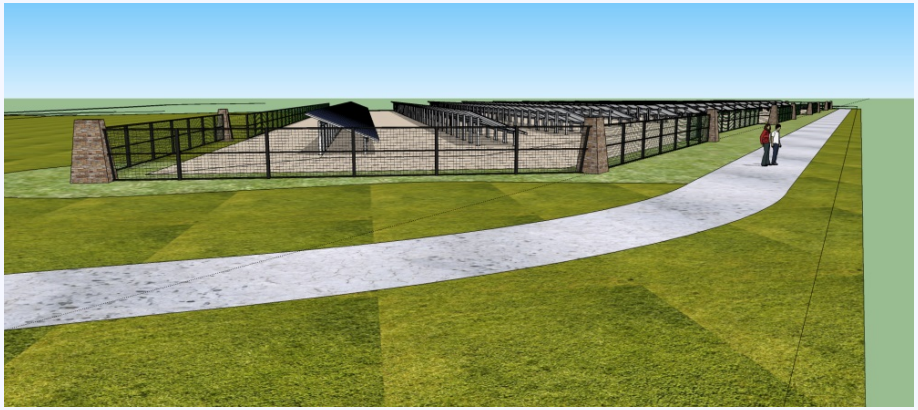
Case Study: Fort Collins Pickle Plant Solar Garden

The Project Team is working with an Art in Pubic Places artist to develop a gateway feature and stone columns for the solar garden fence.



Gateway Feature

Drawings of illuminated stone & metal columns for fence line



Preliminary designs from Artist Robert Tully

Promote Solar as an Accessory Use

Give regulatory breaks for solar panels on rooftops, carports, garages, and walkways as an accessory use

Image courtesy of Intel, Fort Collins, CO

Solar as an Accessory Use

- Permit in all Zone Districts “by-right”
- Exempt from rooftop screening requirement
- Set design standards for roof-mounted panels

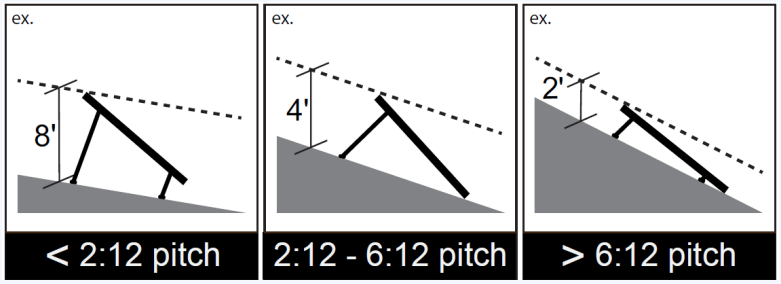


Illustration courtesy of the City of Boulder, CO

Solar Energy Systems as a Principal Use

Solar Garden

Small-Scale
<0.5 acres

Image courtesy of Clean Energy Collective

Medium-Scale
0.5 – 5 acres

Image courtesy of Colorado State University

Large-Scale
> 5 acres

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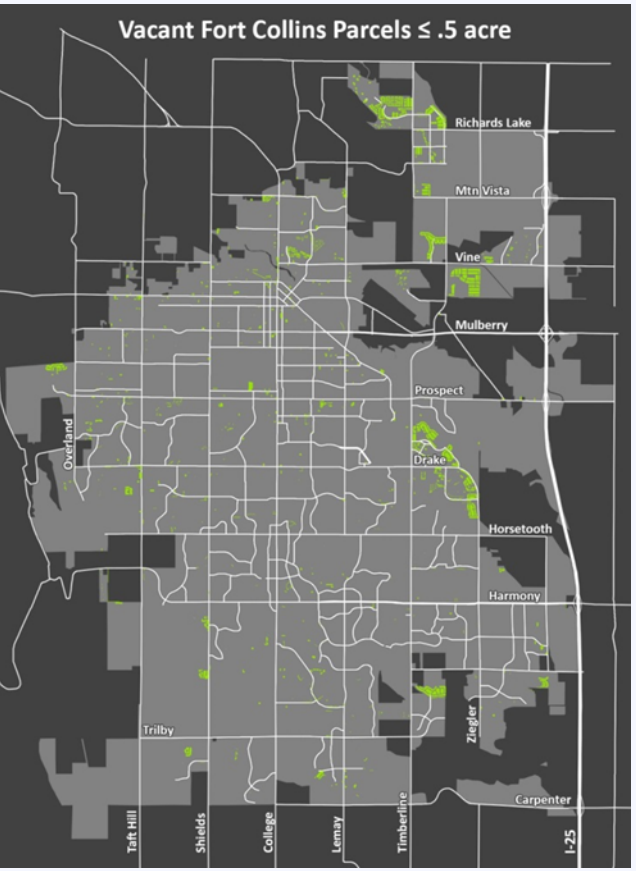
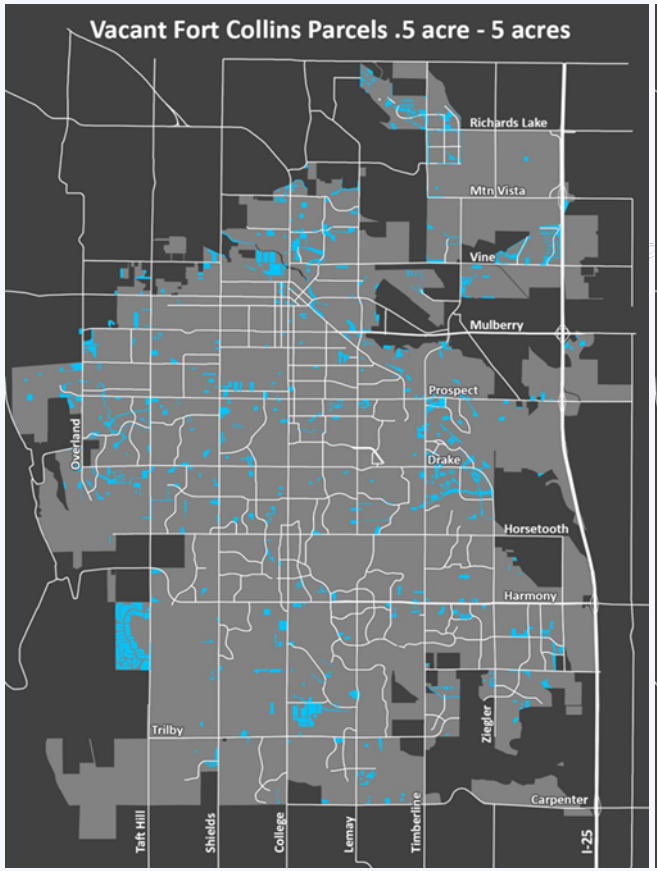
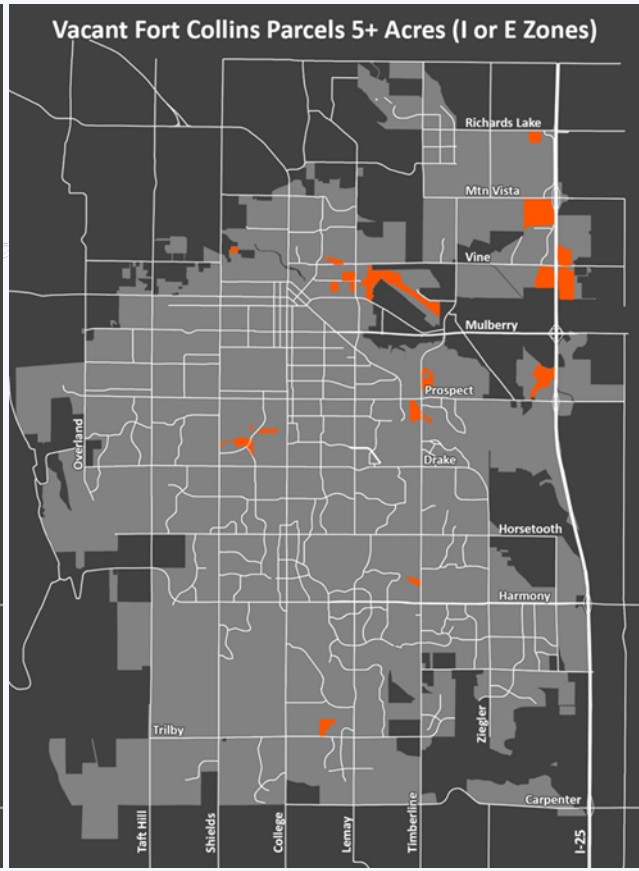
Evaluating Candidate Solar Sites



Small-Scale



Medium-Scale



Large-Scale

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Large-Scale Solar Energy Systems

- Greater than 5 Acres
- Where: Industrial, Employment Zones and brownfield/non-habitable sites by-right; prohibited in other districts
- Design Standards:
  - 30’ setback/100’ from residential
  - 7’ Vinyl clad Security fence/knox box
  - Full-cut off light fixtures
  - Accessory building height limit
  - Electrical interconnection underground
  - Additional screening may be required to protect sensitive views.

Example: CSU Solar 5.3 MW on 30 acres

Medium-Scale Solar Energy Systems

- 0.5 - 5 Acres
- Where: Industrial or Employment Districts under Basic Development Review; Administrative Hearing in all other zone districts
- Design Standards:
  - Principal Building Setbacks
  - Accessory building height limit
  - Electrical interconnection underground
  - 7’ Vinyl clad security fence/knox box
  - Full-cut off light fixtures

Example: Pickle Plant Solar Garden
632 kW on 5 acres

Small-Scale Solar Energy Systems

- < 0.5 Acres
- Where: Planning & Zoning Board review in UE, RF, RL, LMN and NCL zones; by-right in all other districts
- Design Standards:
  - Located within in principal building setbacks
    - may be varied under hardship criteria if needed for solar performance.
  - Accessory building height limit

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Resources:

www. www.municode.com/library/co/fort_collins/codes/land_use - Land Use Code, including solar code

fcgov.com/solar - rebates and other program information

fcgov.com/business-efficiency – assessments and incentives

fcgov.com/utilities/what-we-do - policy

fcgov.com/climatewise – business and the environment