The North Carolina Solar Center

Solar Development in NC:
A plus for local economic development

For the

Local Resources and Local Energy Production Workshop

NC Association of County Commissioners Annual Meeting

August 22, 2013

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www.ncsc.ncsu.edu

NORTH CAROLINA Solar Center

NC STATE UNIVERSITY

Our Mission

The North Carolina Solar Center advances a sustainable energy economy by educating, demonstrating and providing support for clean energy technologies, practices, and policies.

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N.C. Solar Center Overview

- Created in 1988 as a resource for renewable energy programs and information, training, technical assistance and applied research
- Operated by the College of Engineering at N.C. State University
- Funded by the General Assembly though the state Department of Environment and Natural Resources (State Energy Office); as well as other federal and state grants, and service fees

Major Program Areas:

- Renewable Energy
- Clean Power & Efficiency
- Clean Transportation
- Economic Development
- Energy Policy
- Workforce Development
- Education & Outreach

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Thanks to our Industry Advisory Council

ABB

Holocene
Bright ideas. Real solutions.

COHN REZNICK
ACCOUNTING • TAX • ADVISORY

North Carolina Propane Gas Association

G&S GIBBS & SOELL

SUNENERGY1

BAKER RENEWABLE ENERGY

BRADY

Piedmont Natural Gas
Energy that shows.

piedmont biofuels
clean renewable fuels

And to our friends at

NC SUSTAINABLE ENERGY ASSOCIATION

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Solar and Economic Development

- What is the context?
  - Technology Trends
  - Policy Framework
  - Finance Issues

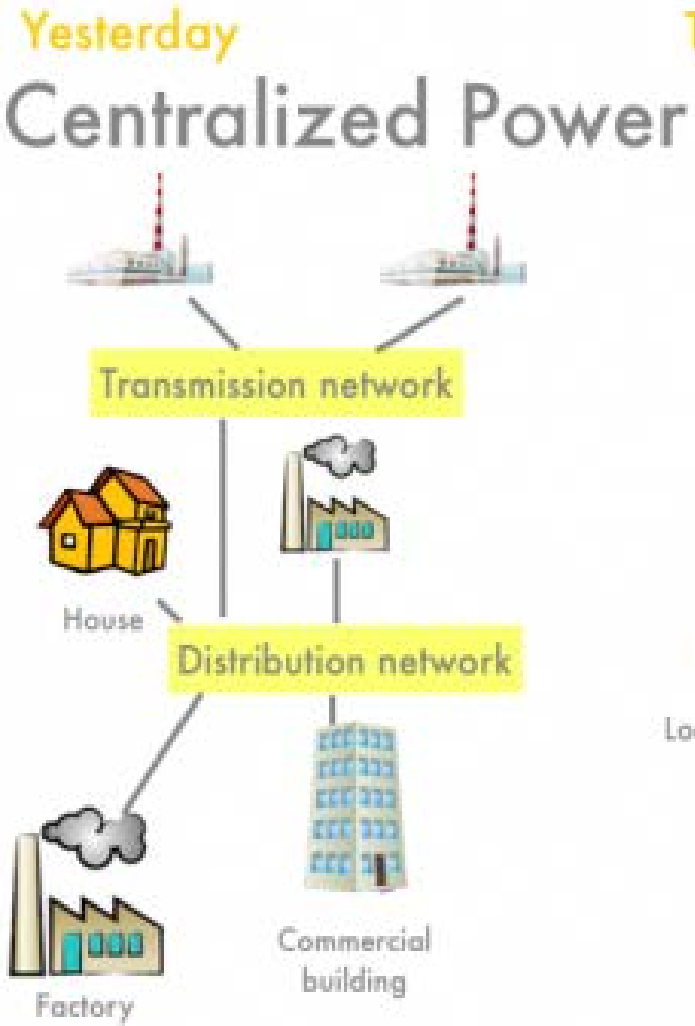
Technology Trends

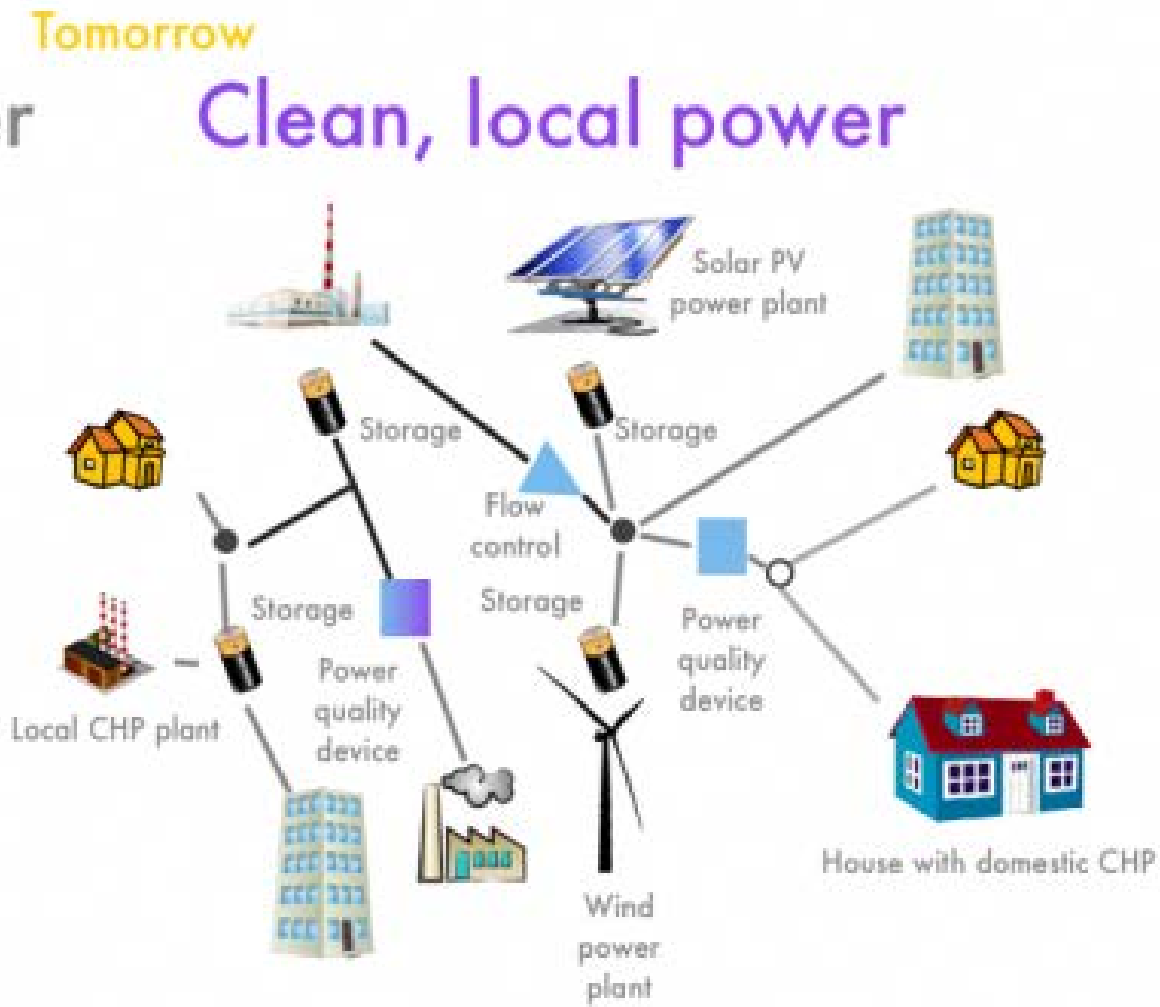
- Falling costs for solar and most DER and other "clean tech"
  - Declining price of natural gas;
  - Henry Ford had it right – the more you build, the cheaper they get
- Higher costs for traditional energy supply
  - New power plant construction
  - Increasing customer, regulatory, and political interest in EE technologies;
  - Increasing regulatory interest in carbon, mercury, coal ash, nuclear, etc.
  - Slowing economic growth trends
- Convergence/Interdependence of Technologies
  - Energy, Electronics, IT, Big Data

Related "Clean Tech"

- Energy efficiency and conservation
- Clean/alternative transportation technologies
  - EVs, CNG, propane, biofuels, emissions reduction
- Other Distributed Energy Resources (DER)
  - Combined Heat and Power
- Smart grid
  - Communications/IT, big data, power electronics

Central Power vs Distributed Generation





Source: Energy Self-Reliant States, Institute for Local Self-Reliance

Different Project Types

6.4 MW Project on Fuquay Farms, NC

4 kW rooftop solar array- Morganton, NC

1 MW commercial rooftop project on an IKEA in Charlotte, NC

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Solar PV Installed Cost/Watt

Year	≤5 kW (Median)	5-10 kW (Median)	10-150 kW (Median)	150-1000 kW (Median)	>1000 kW (Median)	Comparison with selected data
2006	10.00	*	*	*	*	$8.70[a]
2007	10.03	*	*	*	*	$8.80[a]
2008	8.93	8.76	*	*	*	$8.40[a]
2009	8.48	7.66	7.50	*	*	$8.10[a]
2010	7.00	6.28	6.02	*	*	$6.90[a]
2011	6.76	6.03	5.02	4.49	4.35	$6.10[a]
2012	6.27	5.13	4.95	3.75	3.54	

Sources: NC Utilities Commission data; NC Sustainable Energy Association analysis;
(a) Barbose et. al, Tracking the Sun, Lawrence Berkeley National Laboratory, 2012

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Policy Framework

- Federal Policies
- State Policies

Key Federal Policies

- PURPA
- Tax Credits
  - Solar under ITC
  - Wind, Biomass under PTC
  - Accelerated Depreciation (MACRS)

Key State Policies

- Renewable Energy and Efficiency Portfolio Standard (REPS)
- Interconnection and Net Metering
- Investment Tax Credit
- Property Tax Abatement

Senate Bill 3 (SB3) - 2007

- 12.5% Renewable Energy and Energy Efficiency Portfolio Standard
  - Different Provisions for Municipals and Co-ops
- Major Cost Recovery Provisions to Utilities for EE, Clean Smokestacks, Potential New Coal/Nuke Plants
- Tax Relief to Industrials for Electricity

Key Features of NC REPS

- **Target Percentages & Applicability**
  - 10% by 2018 – all electric service providers in state
  - 12.5% by 2021 – only investor owned electric utilities (Duke, Progress, & Dominion)
- **Eligible Technologies**
  - Wide range of renewable, energy efficiency, & thermal technologies (solar thermal & CHP)
  - IOUs - Up to 25% of REPS from efficiency by 2018; Up to 40% of REPS from efficiency by 2021
  - Coops & Munis - Can meet entire standard (other than Solar, Poultry, & Hog Set Aside) with efficiency

Interconnection Standards?

- **Interconnection standards are the legal rules and procedures for "plugging" a renewable energy system into the power grid.** This includes the technical and contractual terms that both system owners and utilities must follow.

- To eliminate the potential for significant barriers to customer-sited renewable energy, the interconnection process must be governed by **a transparent, non-arbitrary set of rules**. Wherever interconnection standards are unclear, or where redundant or unnecessary tests or steps are piled on the existing national standards, the results can be costly.

Interconnection and Net Metering

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NC RE Tax Credit

- Tax credit equal to **35% of the cost of renewable energy property** constructed, purchased, or leased by a taxpayer. May be taken against income tax, corporate tax, franchise tax, or gross premiums tax.
- Eligible costs include: Equipment and associated design, construction cost, and installation costs less any discounts, rebates, advertising, etc.

Non-Profit Eligibility?

- ***SB 3 of 2007*** amended North Carolina's renewable energy tax credit statute to allow a taxpayer who donates money to a tax-exempt nonprofit to help fund a renewable energy project to claim a tax credit. The donor can claim a share of the credit -- proportional to the project costs donated -- that the nonprofit could claim if the organization were subject to tax.
- ***HB 2436 of 2008*** applied this same mechanism to donations made to units of state and local governments.

Property Tax Abatement for PV Systems

- SB 1878 of 2008 created an 80% property tax abatement for PV (solar electric) systems
- For example, a system assessed at $10,000 would pay property tax on $2,000
- Applies to commercial systems taking MACRS depreciation.
- Residential systems not taking depreciation receive 100% property tax abatement.

Financing Issues

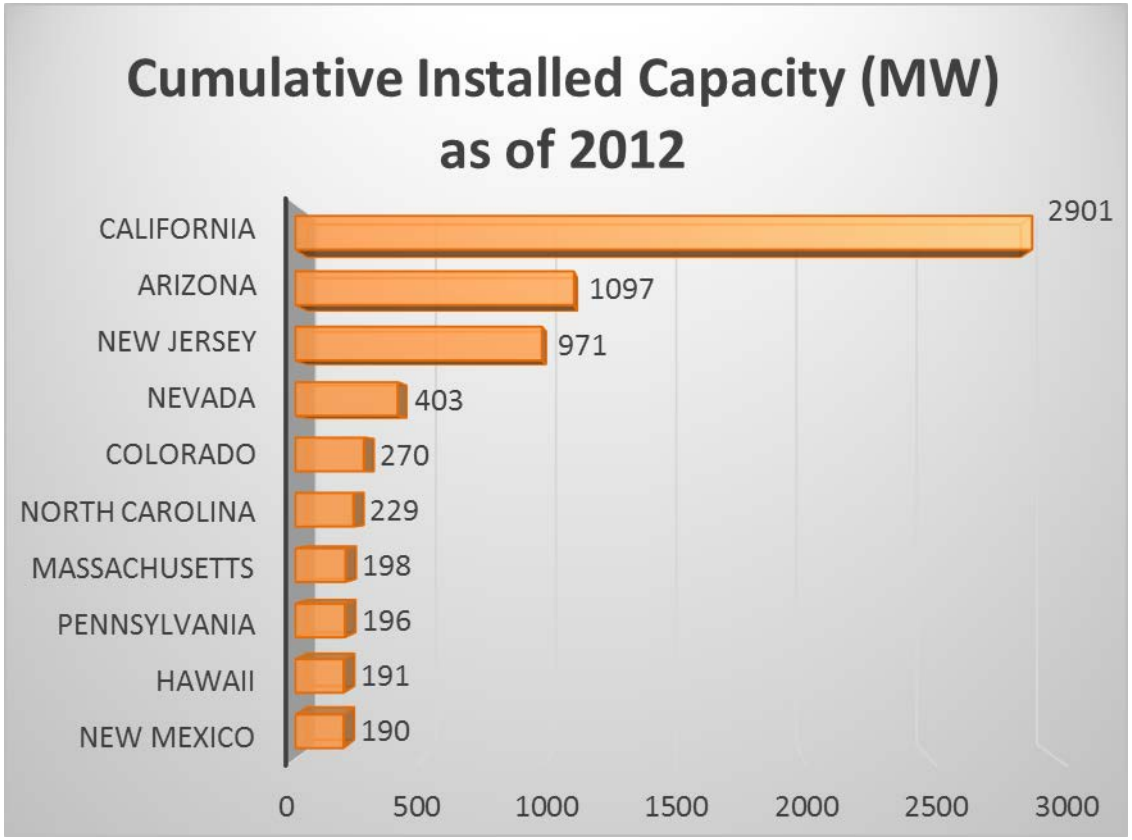
- Technology and Policy – necessary but not sufficient - finance is the key
- Innovation in project finance has been critical market driver – returns are solid and low risk
  - 3rd party investors, tax equity needs
  - always more that can be done
    - severability of fed/state credits
    - 3rd party sales
    - Property assessed clean energy (PACE) programs

Solar and Economic Development

- Why do we care?
  - Investment
  - Jobs
  - Reputation / Perception

North Carolina Leads in Solar

- 501 solar companies, employing about 2,000 people
- North Carolina Ranked 6th in nation for solar with 229 MW installed capacity and 5th for annual capacity in 2012 with 132 MW
  - Mostly from utility-scale projects



Source: SEIA/GTM Research "U.S. Solar Market Insight 2012 Year-In-Review"

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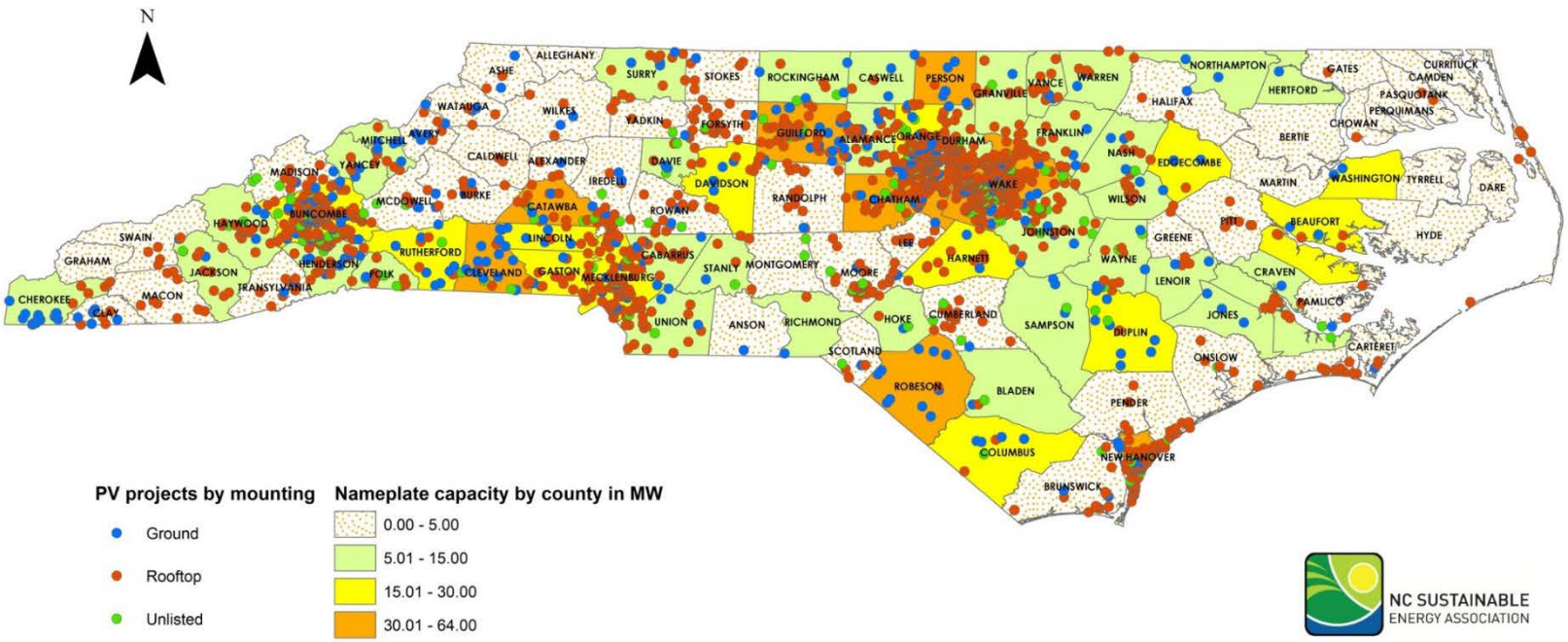
Geographic Diversity of Projects



Expected Year Online	Capacity MW DC (a)	Number of Systems	Solar PV System Capacity			
			10 kW or Less	Greater than 10 kW through 500 kW	Greater than 500 and under 1 MW	1 MW and Greater
2006	0.26	24	22	2	0	0
2007	0.32	54	50	4	0	0
2008	5.49	116	105	7	1	3
2009	25.88	197	167	24	1	5
2010	28.43	351	283	57	2	9
2011	91.59	505	379	107	6	13
2012	407.45	638	483	64	13	78
TOTAL	559.42	1,885	1,489	265	23	108

Notes: (a) Solar PV systems produce electricity in direct current (DC), which is converted by inverters to alternating current (AC), the typical current used throughout the U.S. electric grid. As a result, it is normal industry practice to report solar PV capacity in DC units. For the purpose of this report, for systems registered with AC capacity and an unknown DC capacity an 84% derate factor was assumed.

Sources: North Carolina Utilities Commission data; NCSEA analysis

Solar Investment is Profitable to NC

- In 2011, $11.3 million in renewable energy tax credits were taken in North Carolina.
  - As a result, we saw $108 million in private sector spending on these technologies.
- In 2012, $27.9 million in renewable energy tax credits were taken in North Carolina.
  - As a result, we saw $214.5 million in private sector spending on these technologies.

Jobs in NC Clean Energy Industries

- North Carolina's clean energy sector accounts for over 15,200 full-time equivalent (FTE) employees as of September 2012.
- In 2012, the clean energy sector conservatively generated over $3.7 billion in North Carolina annual gross revenue from clean energy activities.
- Over 200 companies indicate that they provide products and services to the national and international marketplace.

Source: NCSEA 2012 Clean Energy Industries Census

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NC Clean Energy Employment 2012

Business Type	Number of companies reporting activity in:	Proportion of industry active in:	Average FTE	Total FTE Employees	Share of State Clean Energy FTE Employees
Research and development:	298	27%	2.67	3,587	23%
Manufacturing:	138	12%	14.11	3,282	21%
Energy efficient design, building, or construction of new buildings:	591	53%	1.89	2,151	14%
Energy efficiency retrofitting of existing buildings:	429	38%	1.79	1,790	12%
Clean energy systems installer, designer, or developer:	**352**	**32%**	**2.11**	**1,269**	**8%**
Clean energy systems retailer or distributor:	105	9%	3.08	679	4%
Clean energy system owner or operator (including cogeneration systems):	112	10%	5.83	1,276	8%
Education, services and consulting (e.g. law, engineering, finance):	328	29%	2.10	1,239	8%
Business Focus	2353				
Solar:	**501**	**45%**	**1.87**	**1,985**	**13%**
Wind:	121	11%	4.80	805	5%
Biomass:	151	14%	6.04	1,142	7%
Hydroelectric:	63	6%	3.91	236	2%
Geothermal / ground source heat pumps:	232	21%	1.44	598	4%
Smart Grid or AMI/AMR infrastructure:	100	9%	10.01	1,915	13%
Energy efficiency / building sciences:	775	69%	3.06	7,218	47%
Energy storage (including fuel cells):	53	5%	6.57	872	6%
Alternative fuel vehicles (including infrastructure and components):	57	5%	3.75	502	3%

Note: percentages and numbers may contain rounding artifacts

Who plays in Clean Tech?

- RTCC (Triangle Region)
- E4 (Charlotte Region)
- EvolvEnergy Partnership (Asheville Region)
- Rural Projects across the state

So How Can the Center Help?

- Policy Information
  - DSIRE Database
- Training and Resources for Code Officials
- Local Ordinance Assistance
  - Template Ordinance Workshop
  - Technical assistance

The DSIRE Project

Database of State Incentives for Renewables & Efficiency

www.dsireusa.org

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- Created in 1995
- Managed by NC Solar Center in partnership with IREC
- Funded by U.S. DOE
- > 2,700 RE & EE financial incentives & regulatory policies
- Federal, State, Local, Utility
- DSIRE Solar Policy Guide
- DSIRE Solar Policy Comparison Tables
- ~ 200,000 unique visitors/month

PV Inspector Training

- **Audience:** AHJs- including all inspectors and code/fire officials that inspect PV systems
- **Main Topics:**
  - PV Basics
  - NEC Article 690 and 705 as They Apply to PV Installations
  - General Building Codes as They Apply to PV Installations
  - Applicable Marking and Labeling
  - Grounding and Bonding/Wiring Methods and Materials
- **Qualifies for multiple NC Code Officials Qualification Board Credits**
- **For More Information :**
  - Visit: go.ncsu.edu/pvinspectors
  - Training Program Manager, Maria O'Farrell - maria_ofarrell@ncsu.edu

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SunShot U.S. Department of Energy

PV Inspector Resource Page

- **Audience:** AHJ's- including all inspectors and code /fire officials that inspect PV systems
- **Main Resources:**
  - Training Opportunities
  - Installation videos
  - Best Practice Documents
  - Field Inspection Guideline Documents
  - NEC articles
  - Inspector Checklists
  - Industry Reports
  - NABCEP Resource Guide
- **For More Information :**
  - Visit: go.ncsu.edu/pvinspectors
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What is a Template Ordinance?

- Creates a unified approach towards solar development
- Establishes easily adopted language for local governments to implement
  - Includes provisions and law that addresses concerns relevant to North Carolina
- Makes suggestions to local governments about appropriate regulatory standards for solar development

Current NC Ordinances

- 52 Ordinances on county and/or city level
- Solar not uniformly regulated
  - Major discrepancies between various county and city ordinances
- Makes development more difficult and less attractive to potential investors
- Ensure protection of valued ideals

NC Ordinance Status	
General Findings	
Total Ordinances	52
County Ordinances	18
City Ordinances	34
Zoning District Differentiation	
Ordinances that specify solar development standards for each zoning district	12
Differentiation of mount type	
Ordinances that differentiate between freestanding and rooftop systems	11
Height Restrictions	
Ordinances that specify height restriction	21
Surface Area Restrictions	
Ordinances explicitly mentioning coverage (roof or ground-mounted)	19
Setback Requirements	
Ordinances explicitly mentioning solar setbacks	22

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Template Ordinance Workshops

- Partnership between NC Sustainable Energy Association (NCSEA) and NC Solar Center
- Five stakeholder meetings across the state
  - Previous sessions in Raleigh, Asheville, Lumberton, Greensboro
  - Remaining Session – **Charlotte, NC** – Friday, October 18, 2013, 1:00 PM – 5:00 PM, Harris Conference Center (3216 CPCC Harris Campus Drive, Charlotte, NC 28208)

Key Issues for Regulating Solar

- Defining Solar
- Defining Zoning Districts
- Land Use
- Permit Type
- Setbacks
- Height Restrictions
- Surface Area / Property Coverage
- Location / Visibility / Fencing
- Abandonment / Decommissioning

Social and Environmental Impacts: Partnering with the Community

Source: Strata Solar, Kings Mountain, NC, 5 MW

- Counties (building and electrical permits)
- NC Department of Environment and Natural Resources (land and water)
- NC Department of Transportation (driveways)
- Economic and Work Force Development and others
- Community colleges
- Local contractors
- Farmers and businesses

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Solar Externalities?

- Hazardous Materials
- End-of Life/Decommissioning
- Ambient Temperature ("Heat Island")
- Electric and Magnetic Fields (EMF)
- Property Values
- Public Safety (including fires)
- Noise
- Water-Related Impacts
- Glare
- Endangered Species and Natural Heritage

Questions?

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