Center for Energy Education Presents

Rooftop Solar Workshop

The Center for Energy Education invites you to a special community workshop focused on solar installations for homeowners and businesses.





Moderator

Michael Youth- Director of Regulatory Affairs at NC Sustainable Energy Association

NC Sustainable Energy Association Founded in 1978, NCSEA is a 501(c)(3) nonprofit organization of individuals, businesses, and government.







Panel Members



Stew Miller



Randy Lucas



Vinita Moore



Seminar Topics

- Technical aspects of rooftop solar installations for home and businesses
- Financial considerations for rooftop systems
- Working with utility providers for solar installations
- North Carolina regulations relating to rooftop solar projects



2014 NC Clean Energy Industry



22,995 FTE

An annual growth of approximately 25 % since 2012.







\$4.8 Billion in Revenue

North Carolina Clean Energy Industry Census 2014 (2015)

Utilities in the Roanoke Valley Area



Your Location Matters

- Construction rules vary based on Local and County Ordinances
- Check with your Utility Company to see what they offer to solar power providers
- Incentives for solar construction may vary from place to place



What is Rooftop Solar



Not Every Roof is Ready for Solar: Alternative Offerings

North Carolina Green Power

- Allows customers to purchase blocks of 50kWh of renewable energy.
- 4\$/block price split between energy producers and Solar Schools Project Grants



• Allows individuals to invest in portions of solar projects and receive a portion of the power.





EST 2003



What is Net Metering?



TM Yes.

solar solutions™

the power of independence

How Solar Works



What's a Good Site for Solar?

Optimal Conditions

- Roof area facing south, southeast or southwest
- As little shading as possible from trees or any other obstructions
- Roof pitch, or tilt angle, between 20 and 45 degrees

Typical Roof Installation



















Preliminary steps for all projects

- Site and shading analysis
- Analyze usage and estimate production
- Preliminary system design
- HOA review (if required)

Installation Process

Project planning & permitting

- Structural and electrical drawings
- NC Utilities Commission filing and utility company interconnection request
- All applicable permits

System is installed, inspected & interconnected!!!



Roof Penetration



Roof Flashing



Metal Roof



Solar Mounting



Completed Solar Array



Average Solar House

Example:

- 5.6 kilowatts (20 panels)
- Produces about 7,420 kilowatt-hours per year = ~ \$800 savings on electric bill
- (at rate of \$.108/kWh)

Typical Installed Price: \$19,600



Annual Environmental Impact of 14 Panel System



System Monitoring



Thank you







Our Power Source At Work

Nags Head, North Carolina Sunrise September 2014





USE OF SOLAR ENERGY IS NEAR A SOLUTION Copyright 1931, by Science Service. New Tork Diver, Apr 4, 1931, ProQuest Environment Newspapers The New York Times (1851 - 2003)

PS 14

USE OF SOLAR ENERGY IS NEAR A SOLUTION

German Scientist's Improved Device Held to Rival Hydroelectric Production.

TELEVISION IMPETUS SEEN

Sound Films and Automatic Control Instruments Also May Bo Aided by the New Cell.

NEW POWER AGE PRESAGED

Dr. Bruno Lange, Inventor, Bays Technical Advances Promise to Be Astonishing.

Copyright, 1931. by Science Service.

BERLIN, April 3.-The problem of using the vast energy of the sun for human purposes is nearing a solution. Dr. Brune Lange of the Kaiser Wilhelm Institute here has recently perfected a device which converts sunlight into electric current more completive than ever before, at a price which may compete with present hydroelectric installations.

The exhaustion of the world's coal supply in a few hundred years is no longer to be feared if Dr. Lange's claims are justified. On the contrary, there would be more power than ever before. An expansion of

for man throughout the future his-

It is just possible the world is standing at a turning point in the evolution of civilization similar to that which followed the invention by James Watt of the steam engine.

For coal is not only limited in amount. It is also an extremely inefficient vehicle for the sun's energy. The power which can actually be used-for instance. In an incandescent lamp-is a small fraction of 1 per cent of the total sunlight stored in part in the coal, the burning of which at the generating station produces the electric current. Dr. Lange's invention promises to put much of the other 99 per cent to use. Serious problems will, of course, be raised by the fact that the supply of sun-power will not be continuous. Whether these will be anived by some form of storage arrangement or by operating the photogenerators in conjunction with some other kind of generator cannot be said at present. The energy storage problem is closely linked with that of power sources. Some \$25,000 per kilowatt is the estimate that Dr. Lange has made of the cost of installing the copper sandwich on a large scale as a means of trapping the power of sunlight. This at first seems impossibly large, as a hydroelectric station can now be erected at a capital cost of \$100 to \$300 per kilowatt of capacity.

A steam turbine plant using coal is, of course, cheaper to install, but the running costs in labor, fuel and maintenance of equipment are much greater.

Further Improvement Likely.

The hundredfold increase in efficiency by using sliver selenide in place of copper oxide, however, appears in bring the cost within the economic range for competition in the power industry. Apart from this it is likely that further improvements in the form of the cell will be made. The idea is still in its infancy.

A square yard of copper oxide sandwich can produce several watts of energy in full sunlight, Dr. Lange says. Using this as a basis for calculation, it is cary to see that a large power station of 300,000 kilowatts would require an area of about one square mile of the silver selenide calls.



Renewable Energy Investment Tax Credit Overview



Residential:

Credit incentive in year 1 of 'Energy Property' purchased within a tax year.

Tax credit is a dollar for dollar reduction in Federal income tax liability (Form 5695, Form 1040 Ln. 46)

Credit is 30% of all costs through year end 2016





Commercial Buildings:

Federal Tax Credit Incentive in Year 1 of 'Energy Property'

╋

Fed/State Depreciation Expense for Solar Equipment Asset (85%) Purchased & Placed In Service During Tax Year





Federal Overview

orm 3093 Department of the Treasury Internal Revenue Service		Residential Energy Credits Information about Form 5695 and its separate instructions is at www.irs.gov/form569 ► Attach to Form 1040 or Form 1040NR.									95. 2014 Attachment Sequence No. 158			58					
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Federal Overview

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All others:	48	Foreign tax credit. Attach Form 1116 if required	48		
Aarried filing	49	Credit for child and dependent care expenses. Attach Form 2441	49		
eparately, 6,200	50	Education credits from Form 8863, line 19	50		
Aarried filing	51	Retirement savings contributions credit. Attach Form 8880	51		
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Renewable Energy Tax Credit Incentive Overview: Federal

Project Cost: \$14,500

Federal Credit: \$4,350 [14,500*.30]

2015 Federal Tax: \$ 5,575 [Form 1040 Line 47]

2015 Federal Total Tax: \$1,225 [5,575-4,350]













Questions, Comments, & Answers...

(I'm All Ears...)



"Woof!!"

We Thank You For Your Time.

Please Contact Me For A Copy Of Today's Presentation.

Contact Information:

Randy M. Lucas, CPA Lucas Tax + Energy Consulting Phone: 704.968.5506 Email: randy@lucastaxandenergy.com

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Working with Your Public Utility Vinita Moore- November 12, 2015



Duke Energy Progress Website

www.duke-energy.com



Connect to the Grid

Renewables & Customer Generation



Renewable energy resources, such as wind and solar energy, are important to Duke Energy Progress' balanced approach to meeting our region's growing electrical needs and helping to establish a cleaner energy future. We are investing in innovative new sources of energy and there are many ways that you can join us. Please use the links below to learn more about renewable energy, our projects, solar power incentives and how you can buy or sell renewable energy.

Sell Renewable Energy

Have a qualifying facility, such as a solar array or a wind turbine, and want to sell all of the output to us? View the eligibility requirements for our standard rate.

Standard Option

Offset Your Bill With Renewable Energy

Generate electricity for your own use, and then provide what you don't use back to us to help offset future bills.

> Net-Meter Options

Solar Programs for SC Customers

Several new programs will be available starting in late 2015 for customers interested in solar energy.

> South Carolina

SunSense Solar Programs

Our SunSense programs help our customers harness the power of the sun. Learn more about specific programs' rebates and incentives.

Residential Solar PV

Support Renewable Energy

Carolinas customers have the option of supporting the development of renewable energy resources through two voluntary programs.

- North Carolina
- South Carolina

Connect to the Grid

Before installing generation on our system, you must follow the interconnection standards and procedures.

- > North Carolina Interconnection Options & Procedures
- South Carolina Interconnection Options & Procedures



Renewables & Customer Generation

- Sell Renewable Energy
- Offset Your Bill With Renewable Energy
- South Carolina Solar Energy Programs
- > NC GreenPower
- Palmetto Clean Energy
- NC Interconnection Procedures
- > SC Interconnection Procedures
- > Frequently Asked Questions

Application Process

Application

- Interconnection Request
 - Refer to general guidelines for PV System Capacity limits
- Non Refundable Application Fee
- Contingent Approval
- Certificate of Completion



Application Process (cont.)

Documents

- Inverter Manufacturer's Specification Sheet UL 1741 Certified (inverter based generators only)
- Generating Facility Manufacturer's Specification Sheet
- Single Line Diagram with AC Disconnect Switch
- Copy of Insurance Declaration of Coverage
 - Residential: \$100,000 per occurrence
 - Non-Residential: \$300,000 per occurrence
- NCUC Report of Proposed Construction



Application Process (cont.)

Installation of Panels (DO NOT Energize system)

- Local Jurisdiction Inspection (requirements vary)
- Duke Engineer Field Inspection (>10kW)

Bi-directional Meter Exchanged



 Each project is different. On average, small solar projects can be completed within 90 business days. If no road blocks, projects may be completed within 45 business days.

SMALL SYSTEMS OF 20 kW OR LESS – GETTING STARTED

Most small solar systems fall into the category of inverter-based generation with a capacity of 20 kW and less. If this sounds like you, follow this easy process.

 Step 1. Access and complete the <u>Interconnection Request Online Application</u> OR download, print and mail in the <u>Interconnection Request form</u>. In either case, the form requires information that your installer or contractor can provide.



SunSense 2015

Fully Subscribed

- Step 2. Decide on a contractor/installer and the system you'd like to install.
- Step 3. Complete and submit the Interconnection Request, required documents with your Interconnection Fee (\$100).

NC Interconnection Process (cont.)

- Step 4. Receive approval to proceed from Duke Energy to interconnect your system with Duke Energy's.

- Step 5. Install the interconnection to Duke Energy's system.
- Step 6. Access and complete this <u>Certificate of Completion form</u> online OR download, print and submit the Certificate of Completion form with local inspection.
- Step 7. Receive approval from Duke Energy to energize your newly installed system.
- Step 8. Congratulations, bi-directional meter exchanged! You may begin using electricity from your newly installed system.

Team Effort



The Solar Service Center is the centralized point of contact and their process requires communication and coordination back and forth between various internal and external groups before the project can be completed.

Thank you

Duke Energy Progress Solar Service Center

Public Staff NC Utilities Commissions

Phone: 866-233-2290 Fax: 980-373-5244 customerownedgeneration@duke-energy.com Application link for all renewable energy projects, regardless of size:

http://energyapps.nc.gov



A Residential Customer Guide to Going Solar: Duke Energy Progress Version



for Duke Energy Progress Residential Customers

DUTREAC

DSIRE

Database of State Incentives for Renewables & Efficiency

www.dsireusa.org



NC Clean Tech Center

Local Utilities Contact Information

- Duke Energy Progress
 - <u>https://www.progressenergy.com/carolinas/</u> <u>business/renewable-energy/</u> <u>sell/index.page</u>
- Dominion NC Power
 - <u>https://www.dom.com/solar</u>
- Halifax EMC
 - (252) 445-5111
- Roanoke EMC
 - <u>http://</u> <u>www.roanokeelectric.com/</u> <u>CommunitySolar</u>

- Edgecombe-Martin EMC
 - <u>http://ememc.com/renewable-</u> <u>energy-center/</u>
- Town of Enfield
 - Electric Department
 (252) 445-5181
- Town of Scotland Neck
 - Scotland Neck Utilities
 (252) 826-3712
- Town of Hobgood
 - Sharon Hackney, Electrical Commissioner