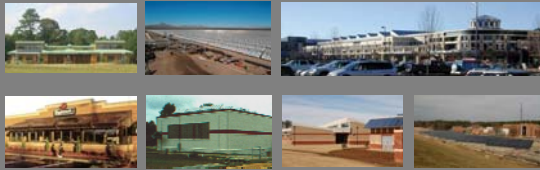


Solar Opportunities for UNC-CH RECs, REPS and Solar Developers



Innovative Design

Innovative Design...

leader in
sustainable school design



- 33 years
- 4750 energy-efficient, environmentally sound buildings

www.innovativedesign.net



- Numerous sustainable commercial and public buildings



- 18 new green educational facilities
- 41 green school renovations
- Green consultant to 65 other A&E firms
- \$1 billion in green educational facilities

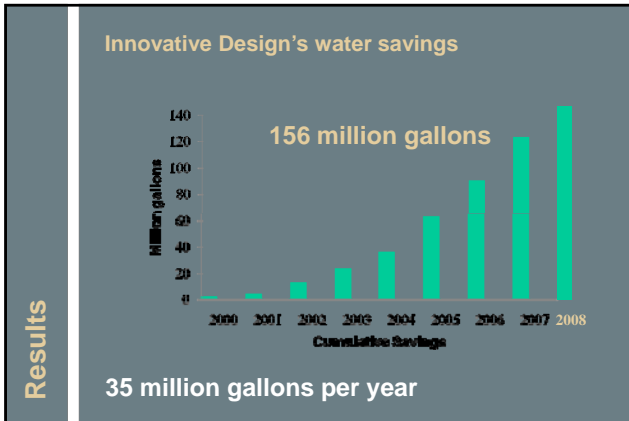
Innovative Design's 4,755 buildings have saved:



- \$100 million in energy bills
- Over 1 billion kilowatt-hours
- 760,000 tons of CO2
- 123 million gallons of water

Results

Equal to a 42.5 megawatt power plant



Results

Nevada Solar One

- 64 Megawatts (performing at 70 peak)
- 130,000,000 KWHs per year
- 15,000 homes
- 200 million pounds CO2

Results

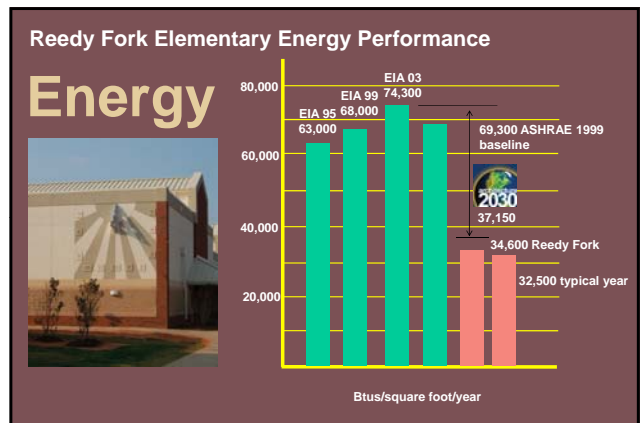
Cost

- \$240 million
- \$3,750/kw
- \$3,400/kw (at 70MW)

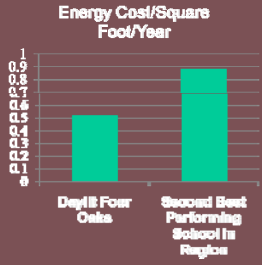
Results

5% below budget

Even with extensive green strategies and rising prices, our school construction costs have averaged 5% below budget



Four Oaks Elementary School
First year – Best Energy Performance in Region



Daylighting



Roy Lee Walker Elementary, McKinney, TX

Rainwater

Sustainability Focus

Sustainability Focus



Heritage Middle School
Wake Forest, NC
Less nitrogen leaves site after the school was built
Now valued at \$.37/sf

Nitrogen

21.2 pounds of nitrogen per acre x \$25 (to \$28) per pound x 30 years = \$16k per acre or \$.37 per square foot



Carbon

Sustainability Focus

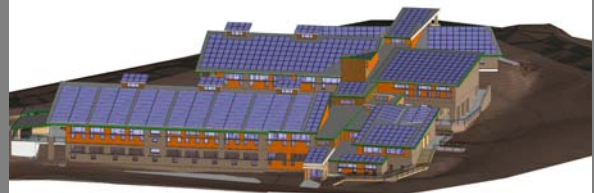
Power Purchase Agreements between City of Raleigh, Southern Energy Management and Progress Energy

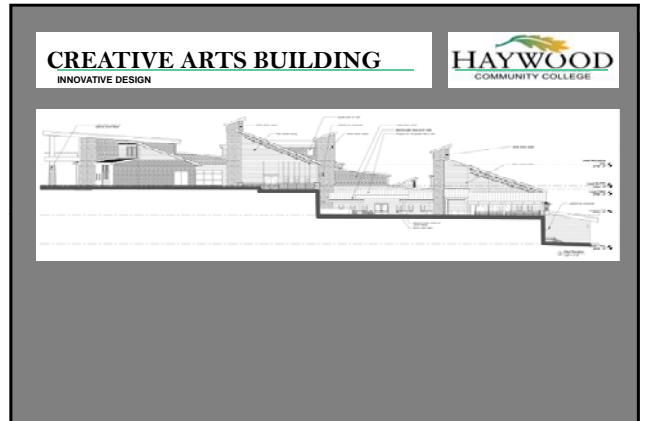
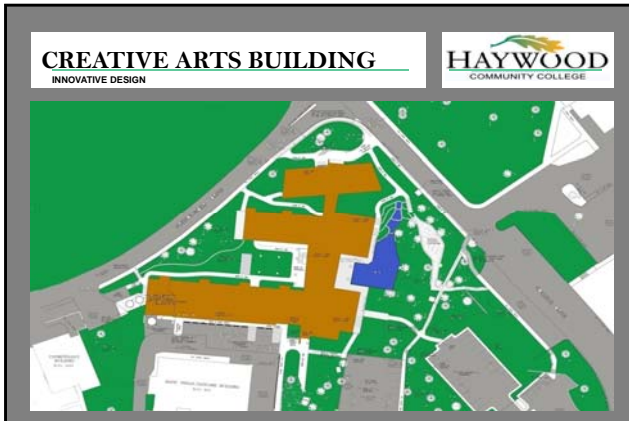


CREATIVE ARTS BUILDING
INNOVATIVE DESIGN

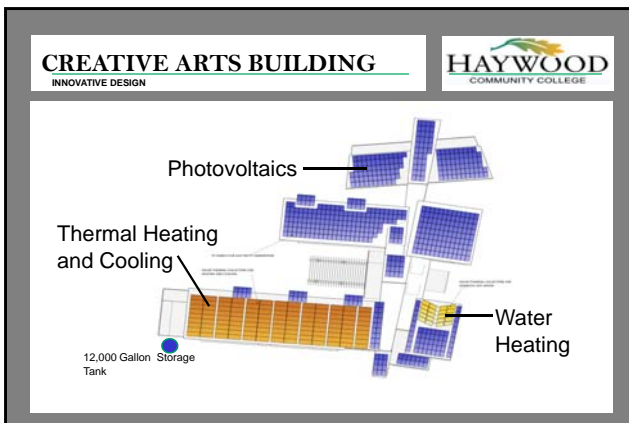


36,500 square foot building





CREATIVE ARTS BUILDING		HAYWOOD COMMUNITY COLLEGE	
INNOVATIVE DESIGN			
Energy Saving			
	Btus/sqft/year	% reduction	
ASHRAE 90.1 base building with plug loads	98,900		
SB 668 requirement of 30% reduction	69,200	30%	
AIA Goal for 2030 Challenge (60% reduction)	39,800	60%	
Design before solar systems	86,400	13%	
Solar Thermal (30,900)	55,500	44%	
Photovoltaics (24,780)	30,700	69%	
Design with solar	30,700	69%	
Projected plug loads	18,600		
Net energy consumption (excluding plug loads)	12,100		



CREATIVE ARTS BUILDING		HAYWOOD COMMUNITY COLLEGE	
INNOVATIVE DESIGN			
Photovoltaic System			
Total Peak	206kw dc		
Annual production	265,500 kwh (25 degree tilt)		
Size of Array	655 panels x 17.55 square feet		
	11,495 square feet		
Watts/panel	315watts		
Basis of Design	Sunpower 315		
Annual Contribution			
	24,800Btus/square foot/year		
	902.5 Mbtu/year		

CREATIVE ARTS BUILDING

INNOVATIVE DESIGN



Solar Thermal (Space Heating and Cooling)

Size of Array 117 collectors x 48 square feet
5,616 square feet
Basis of Design CPC, 48 square foot
System Glycol

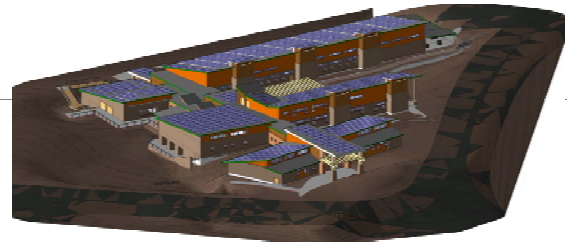
Solar Thermal (Space Heating and Cooling)

Size of Array 20 collectors x 24 square feet
480 square feet
Basis of Design CPC, 24 square foot
System Drainback

Annual Contribution 30,900 Btus/square foot/year
1,125.1 Mbtu/year

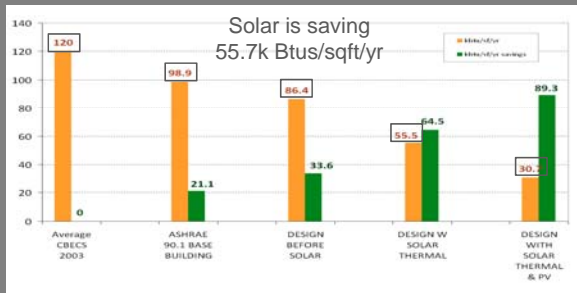
CREATIVE ARTS BUILDING

INNOVATIVE DESIGN



CREATIVE ARTS BUILDING

INNOVATIVE DESIGN



CREATIVE ARTS BUILDING

INNOVATIVE DESIGN

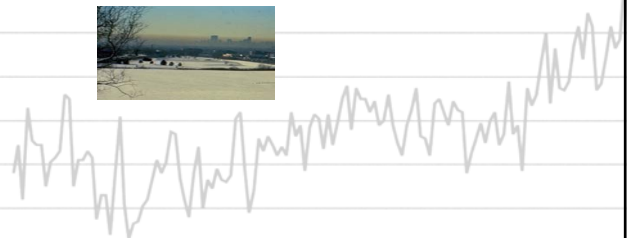


Key Energy Drivers in NC

Carbon Emissions Trading

Renewable Energy and Energy Efficiency Portfolio Standard

Renewable Energy Certificates



Emissions Trading

Emissions Trading

- At UN Conference on Environment and Development (Earth Summit) in 1992, the world leaders accepted fact that climate change was being caused by human activities
- UN Framework Convention on Climate Change
- Kyoto Protocol
 - 182 countries have ratified
 - US has not yet ratified



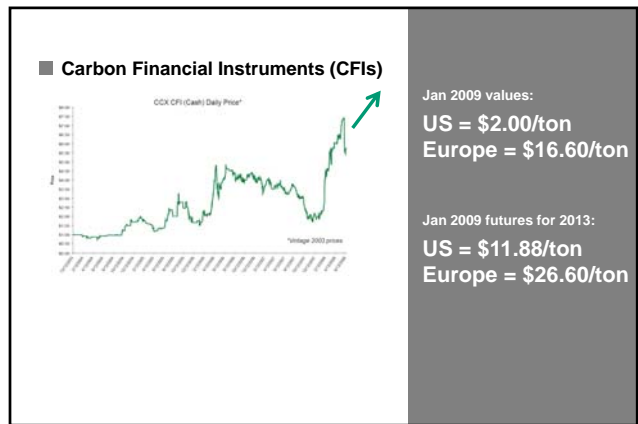
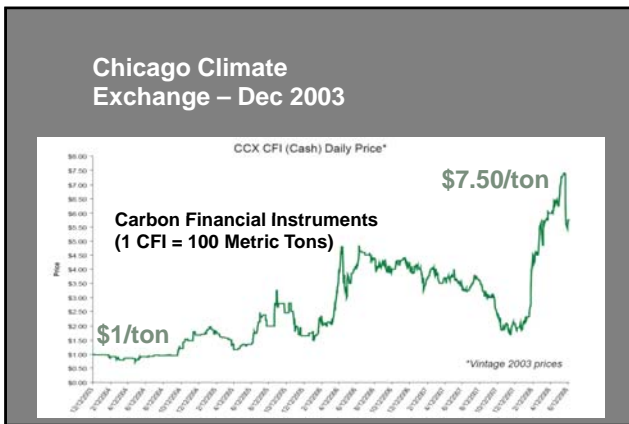
Emissions Trading

Emissions trading provides economic incentives to reduce emission of six greenhouse gases (GHGs)

	Global Warming Potential (GWP)
Carbon Dioxide	1
Methane	21
Nitrous Oxide	310
HFCs	140-11,700
PFCs	7,850
Sulfur Hexafluoride	23,900

Carbon Dioxide equivalent

CO₂ e



Carbon Financial Instruments (CFIs)

Emissions Trading

Rate of coal emissions = 2.1 lbs/kwh
Cost per kwh = \$.10/kwh

In the US (2008 high)
@ \$7.50/ton (2000 lbs) = \$.008/kwh + \$.10/kwh = \$.108/kwh

In Europe (2008 high)
@ \$35/ton = \$.037/kwh + \$.10/kwh = \$.137/kwh

North Carolina

3.0% of 2011 sales by 2012
6.0% of 2014 sales by 2015
10.0% of 2017 sales by 2018
12.5% of 2020 sales by 2021

Renewable Energy & Energy Efficiency Portfolio Standard

NC Senate Bill 3 2007

REC Market

- Renewable Energy Certificates (RECs)
- RECs represent environmental attributes of electricity generated from renewables

Currently bigger driver in US

Means by which utilities are addressing Renewable Energy Portfolio Standards (REPS)

Renewable Energy Certificates

REC Market

Personal home with 4kw PV

5 to 7cents/kwh – Progress Energy plus

15 cents/kwh – NC Green

Renewable Energy Certificates



Trading Platforms



- Regional Greenhouse Gas Initiative RGGI
- RGGI Observer
- Midwest GHG Reduction Accord
- MGRRA Observer
- Western Climate Initiative
- Western Climate Initiative Observer
- Individual State Cap-and-Trade Program

Emissions Trading



RECs

Trading Platforms

- WREGIS: Western Renewable Energy Generation System
- M-RETS: Midwest Renewable Energy Tracking System
- NEPOOL GIS: New England Power Pool – Generation Information System
- ERCOT: Electric Reliability Council of Texas
- PJM - GATS: PJM – Generation Attributes Tracking System (11States + DC)

- NC-RETS: North Carolina Renewable Energy Tracking System

Emissions Trading



Tax Advantages in NC

- 35% State Tax Credit (Daylighting, Passive Solar, Solar Water Heating, PV, Wind)
- 30% Federal Credit/Grant (Solar Water Heating, PV)
- 5 year, Federal Accelerated Depreciation (versus 20 years)
- Federal Energy Efficient Commercial Building Deduction

How can public institutions take advantage of tax benefits?

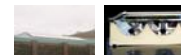
35% State Tax Credit, maximum \$2.5 million



Daylighting

Passive Solar

Solar Water Heating



Photovoltaics



Wind



30% Federal Tax Credit / Grant

Solar Water Heating



Photovoltaics



Federal Accelerated Depreciation

Federal Accelerated Depreciation (vs. 20 years)

Modified Accelerated Cost Recovery System (MACRS)

year 1	62.22%
year 2	15.11%
year 3	9.07%
year 4	9.07%
year 5	5.43%
year 6	2.74%

Solar Financing Options of Cities and Counties

Financing

Current

- **Qualified Energy Conservation Bonds**
Fed's provide tax credits (on 70%) in lieu of interest payments
\$800 million nationally
- **Clean Renewable Energy Bonds**
Fed's provide tax credits (on 70%) in lieu of interest payments
\$267 million nationally for gov'ts

Solar Financing Options of Cities and Counties

Financing

Soon

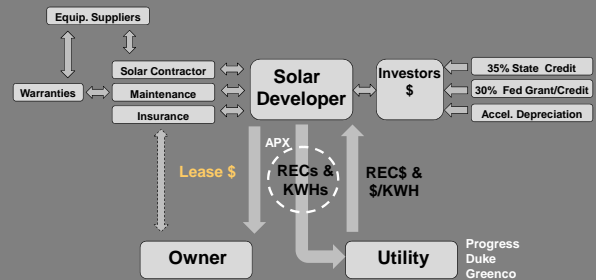
- **Clean Renewable Energy Bonds**
0% interest loans
\$2.4 billion nationally
Apply to feds
- **Qualified Energy Conservation Bonds**
0% interest loans
\$3.2 billion nationally
North Carolina receives \$95 million

Result

- Solar Developers willing to implement solar system at no cost to owner
(Install + Finance + Operate + Maintain)
- Solar Developer leases space from owner
- Developer enters into 10 to 20 year, power purchase agreement with utility
- Developer takes advantage of tax incentives, REC sales and power sale for approximately 6 years
- Then, at "fair market value," transfers ownership plus remaining benefits of power and REC agreement to owner

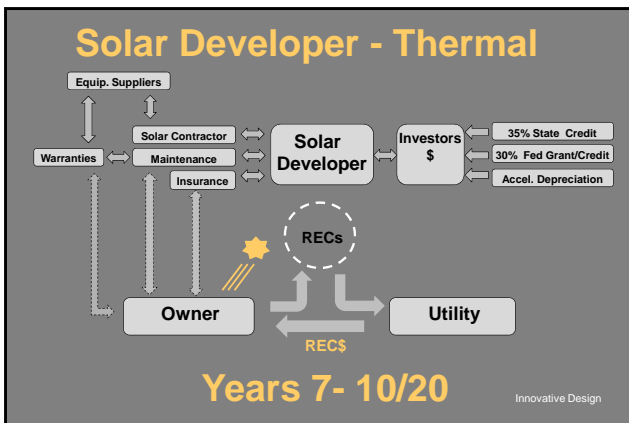
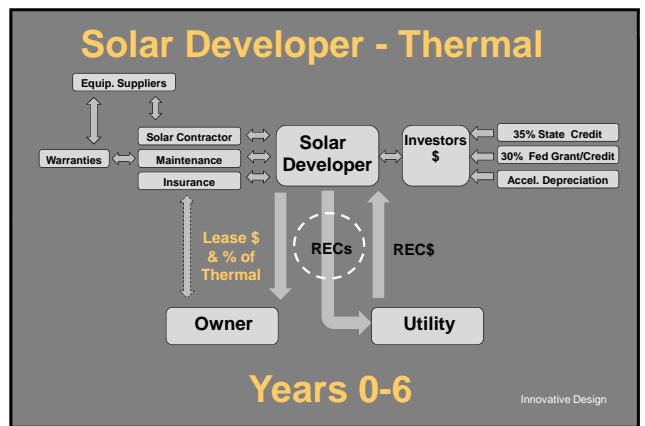
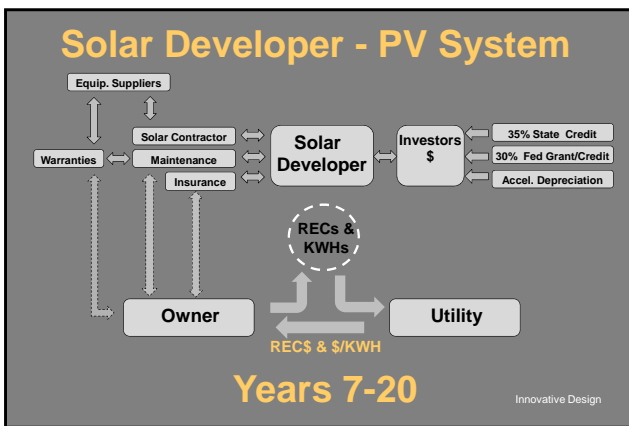
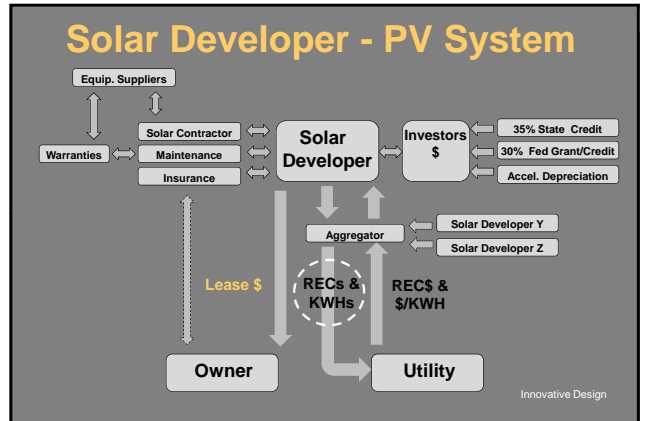
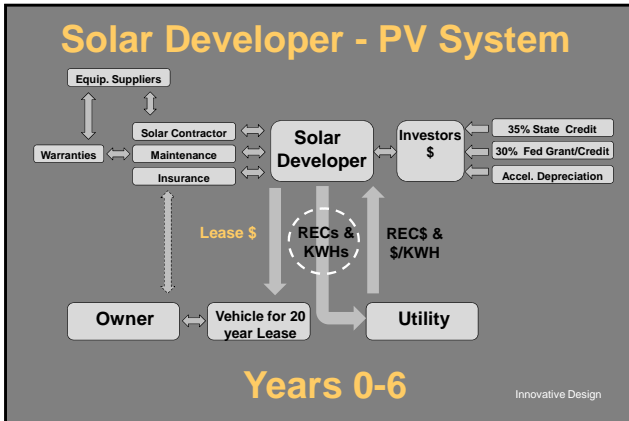
Solar Developer Options

Solar Developer - PV System



Years 0-6

Innovative Design



Legal Issues

- Access Agreement
- Lease Agreement

Solar Developer Options

■ Lease Agreement

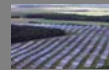
- Description of what is being leased
- Terms of lease
- Use
- Maintenance (appearance, record keeping, etc.)
- Applicable laws/ordinances
- Zoning
- Installation and testing (solar access, permits, approvals)
- Monitoring (real-time, public access)
- Hazardous materials
- Taxes
- Insurance (liability, workers comp, property)
- Destruction of system
- Termination
- Indemnification
- Force Majeure
- Covenants
- Representations and warranties
- Owner's right to inspect, approvals

Solar Developer Options

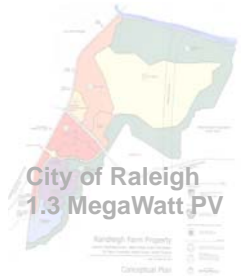
■ Lease Agreement

- Purchase of system at "fair market value"
 - Net present value
 - Replacement – Depreciation

Solar Developer Options



Power Purchase Agreements between City of Raleigh, Southern Energy Management and Progress Energy



Power Purchase Agreements between City of Raleigh, Carolina Solar Energy and Progress Energy





How Innovative Design can help you with Power-Purchase Agreements

- Survey existing facilities and sites
- Cultivate solar developer interest
- Coordinate with utilities to determine interest in REC/power sales
- Develop RFP for solar developers
- Assist in evaluating, negotiating and contract with developer
- Represent owner during construction

