

Chicagoland Roofing Council & 'Rooftop Harvesting'



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CRC Education – ‘Rooftop Harvesting’

- **Outline**

- *Who is CRC, Local 11 & Chicagoland JATC?*
- *What’s Illinois’ Roofing Licensing Law*
 - *“The Details make the Difference”*
- *Why does it make sense?*
 - *Enforcement Locally Means?*
- *Chicago & Suburbs Roof Energy Code Requirements*
- *Rooftop Harvesting Options*
- ***Questions...as we go.***



CRC Education- 'Rooftop Harvesting'

- **Who is CRC?**

- ***CRC Members Cover the Region***

- *No. Illinois*
 - *No. Indiana*
 - *So. Wisconsin*
 - *Downstate IL*

- ***Roofs - Low Slope, Steep Slope***

- ***Traditional BUR, Single Ply, Reflective and Ballasted Green Roofs, Vegetative Green Roofs, Photovoltaics***
 - ***Waterproofing & Damproofing, Air Barriers***



CRC Education-‘Rooftop Harvesting’

- ***CRC Members are Involved...***

- CRC Membership Meetings

- Education – Energy, Insurance, Safety, Codes
- Relationships - Luncheons
- Celebrate Students – Scholarship
- Contractors, Manufacturers, Distributors, Consultants, Others...



CRC Education-‘Rooftop Harvesting’

- ***CRC Members are Involved...***

- CRC Members are IL Licensed Contractors

- CRC Membership means Value

- Education

- Seminars – OSHA, City of Chicago

- Committees

- **Website Listing @**

Chicagoroofing.org



CRC Education-‘Rooftop Harvesting’

- *CRC Members are Involved...*

- Committees

- Industry Affairs – Chicago Code, ICC Code, Legislative

- Safety – Fire, Fall Protection

- Program - Meetings

- Contract & Insurance - Programs

- Annual Legislative

Reception



CRC Education-‘Rooftop Harvesting’

Legislative Committee – Chicago, State of IL

– Advocacy for the Roofing Industry

- State of IL Licensing

– Chicago Energy Code &
Urban Heat Island Ordinance

– International Building, Fire,
Green and Energy Code Development



CRC Education – ‘Rooftop Harvesting’ Professional Roofing Contractor’s Life

- “The Life of the Roofing Contractor”
 - **Technical Issues – Comply with....**
 - **Wind, Weight, Ventilation, Underlayment, Insulation, Drainage**
 - **Workforce Education & Safety – ‘Culture’**
 - **Insurance Required – WC, GL ... *FOR ROOFING WORK***
 - **Warranty**
 - **Specification Sections – Division 07**
 - **International Building Code – Chapter 15, 11,**
 - **International Residential Code – Chapter 9**
 - **International Energy Conservation Code 2009 – STATE LAW**
 - **International Green Construction Code - 2012**
 - **International Fire Code**
 - **Chicago Energy Code & Chicago Municipal Building & Fire Code**
 - **Installed Cost – Competitive Market**
 - **Licensing – Limited / Unlimited**
- **CRC Members - Experience, Safety Culture, Value**



CRC Education-‘Rooftop Harvesting’

- Why IL Licensing for Roofing Contractors??

“...safeguard the life, health, property, and public welfare of its citizens....”

Why? Sets Minimum Requirements for Roofing Contractors for roofing purchaser protection...



CRC Education-‘Rooftop Harvesting’

- Why IL Licensing for Roofing Contractors??

A Professional Roofing Contractor has:

- ***Proper WC and GL Insurance***
- ***Pays into IL State WC Insurance funds as Roofing Contractors, and pays workers tax liability as the employer...***
- ***much more...***



CRC Education-‘Rooftop Harvesting’

- IL Roofing License Types
- Definition: "**Limited roofing license**"
 - ...means a license made available to contractors whose roofing business is **limited to residential roofing, including residential properties consisting of 8 units or less...**



CRC Education-‘Rooftop Harvesting’

- IL Roofing License Types
- Definition: “**Limited roofing license**”
 - *Limited License - DOES NOT INCLUDE COMMERCIAL, INDUSTRIAL, INSTITUTIONAL STEEP SLOPE BUILDINGS...*



CRC Education- 'Rooftop Harvesting'

- IL Roofing License Types
- Definition: "**Unlimited roofing license**"
 - ...means a license made available to contractors whose roofing business is **unlimited in nature** and includes roofing on ***residential, commercial, institutional and industrial properties...***



CRC Education-‘Rooftop Harvesting’

- Once Licensed...IL LAW STATES
 - LICENSE NUMBER and ROOFING CONTRACTOR LICENSEE NAME AS IT APPEARS ON LICENSE ...
 - ‘...Affix to Contracts and Bids’
 - ‘...Affix Commercial Vehicles’
 - ‘...on all Advertising’
 - ‘...at conspicuous place at place of business

–Expiration Date ...on all licenses



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IL Licensing Violations & Penalties

- **How to Report?**

- **Complaints**

- <https://www.idfpr.com/dpr/FILING/Complaint.asp>

- **IDFPR Website Complaint Forms**

- <http://www.idfpr.org>

- <https://www.idfpr.com/dpr/FILING/Complaint.asp>

- **How to Find Roofing Professions Licensed by IL DFPR**

- <http://www.idfpr.com/dpr/who/roof.asp>

- <http://www.Chicagoroofing.org>



CRC Education-‘Rooftop Harvesting’

- Rooftop Harvesting falls under Roofing Codes
 - Chicago Energy Code
 - 2009 Version
 - ICC International Energy Conservation Code
 - IECC – 2009 – Illinois
 - Energy and the Rooftop....Chicago first



CRC Education - 'Rooftop Harvesting'

Chicago Energy Code

- **URBAN HEAT ISLAND EFFECT – Def.**
 - A microclimatic condition wherein large amounts of dark absorbing surfaces (such as asphalt paving and dark roofs) trap energy from sunlight and release it back into the atmosphere, causing higher ambient temperatures and higher pollution levels.
 - **Secondary Effect – Garden Roofs for UHI = Slowed Water Runoff**

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Chicago Energy Code – 2009

- ***Projects Permitted after*** April 22, 2009
 - Urban Heat Island Effect Ordinance – Reduce Temp..
 - **Reflectivity** - Lower temperature & save energy
 - Low Slope Roofs - <2" : 12" ...
 - Medium Slope Roofs – 2" :12" to 5" : 12" ...
 - **Vegetative** Roof Overburden Systems
 - **Photovoltaics**
 - Insulation Requirement – R-20

CRC Education - 'Rooftop Harvesting'

Chicago Energy Code

- ***Requirements – 2009 Energy Code***

- Reflectivity - Lower temp. & save energy

- Low Slope- <2":12"72 NEW, ***OR .50 AGED 3 years***

- Vegetative Roof Overburden Systems

- Intensive
- Extensive
- Pre Vegetative Modules
- .30 Reflectivity Allowance for 50%
 - Fire Breaks

CRC Education - 'Rooftop Harvesting'

Chicago Energy Code - Reflectivity

- **Single Ply Smooth & Ballasted**
 - TPO Smooth
 - PVC
 - EPDM
- **BUR & Gravel (.30)**
 - Asphalt, Coal Tar
- **SBS Modified Bitumen**
- **Hot Rubberized Asphalt**



As a Result...Codes

Cool / Green & Insulated Roofs

- ❑ Roof surfaces with high solar reflectance & Insulation
 - ❑ Urban Heat Island Effect

- ❑ In **Chicago Code** –
 - ❑ 72% or 50% - ***AGED 3 YEARS Solar Reflectance***
 - ❑ Exceptions – 15lbs. Ballast;
 - ❑ Ballast Green is ‘means to hold the roof’ – ‘Mass is Mass’
 - ❑ Roof Membrane, Insulation, Surfacing
 - ❑ Vegetative Green Roofs
 - ❑ Photovoltaics
 - ❑ Reflective Green
 - ❑ R-20 ci – Continuous Insulation Green
 - ❑ Average R for tapered, Dept. of Environment Interp., March 2009

As a Result...Codes

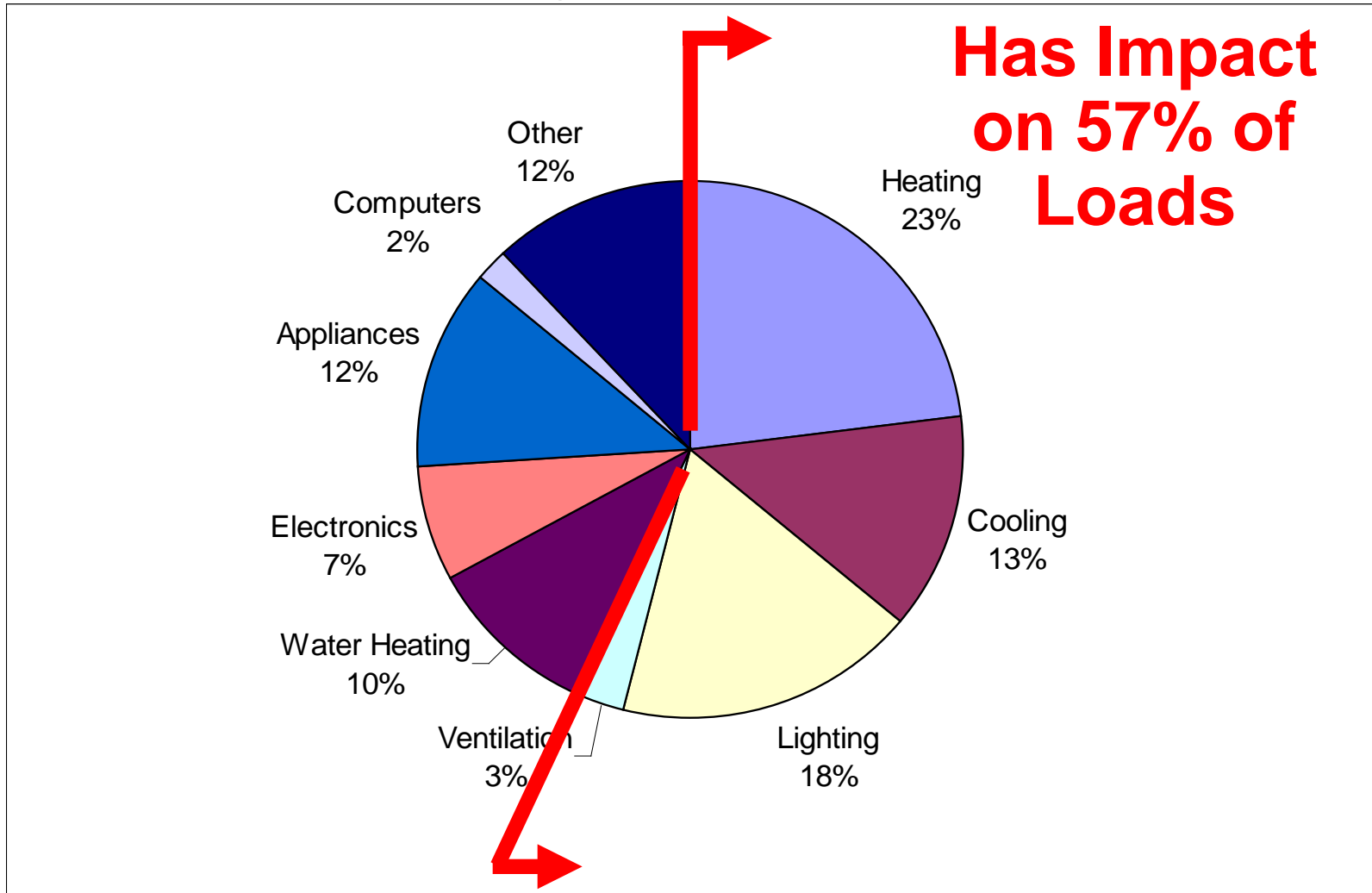
Cool / Green & Insulated Roofs

- ❑ In **ICC IECC 2009** Code; ASHRAE 90.1
 - ❑ Reflectivity Not Required
 - ❑ R20ci Insulation is required...
 - ❑ Continuous,
 - ❑ But...tapered....

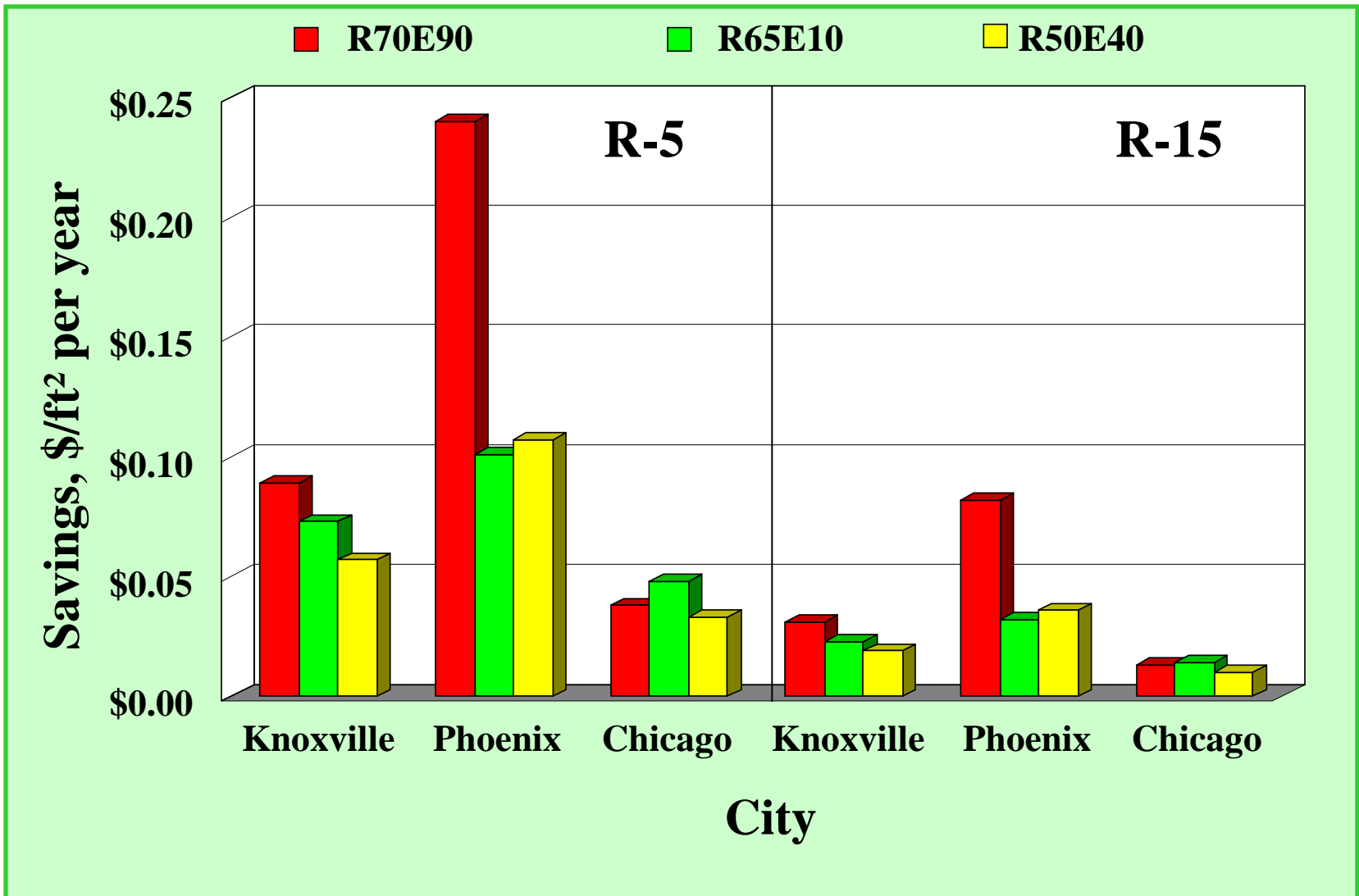
- **IECC 502.2.1 Roof assembly.**
 - The minimum R-20 thermal resistance -
4' from the drain...



Building consumption & envelope contribution



ROOF ENERGY SAVINGS - REFLECTIVITY

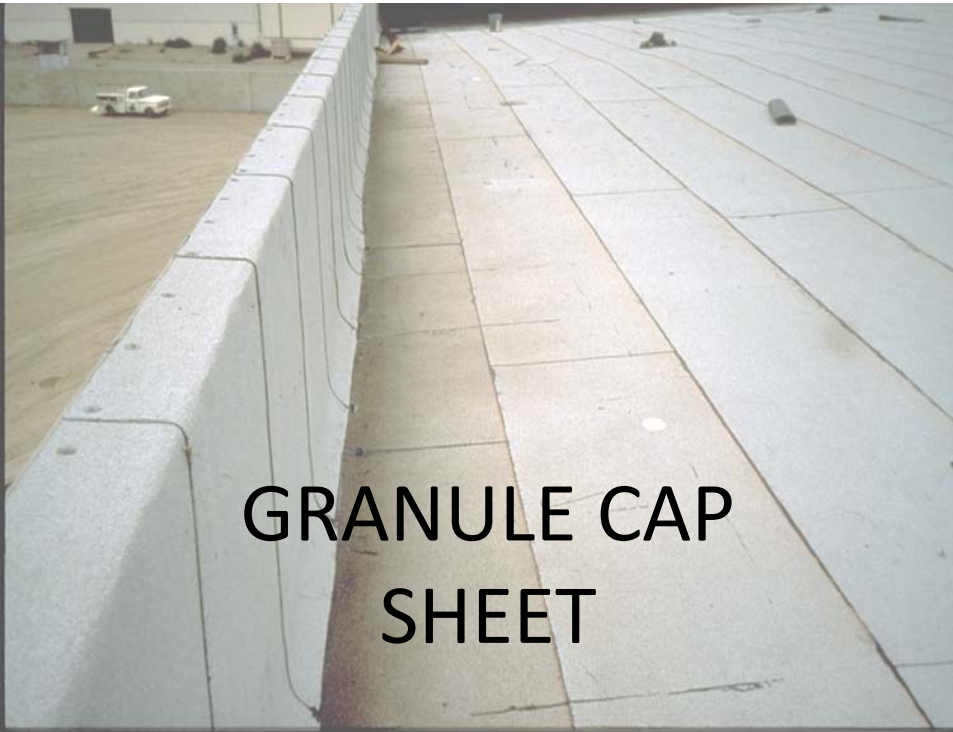


Surfacing

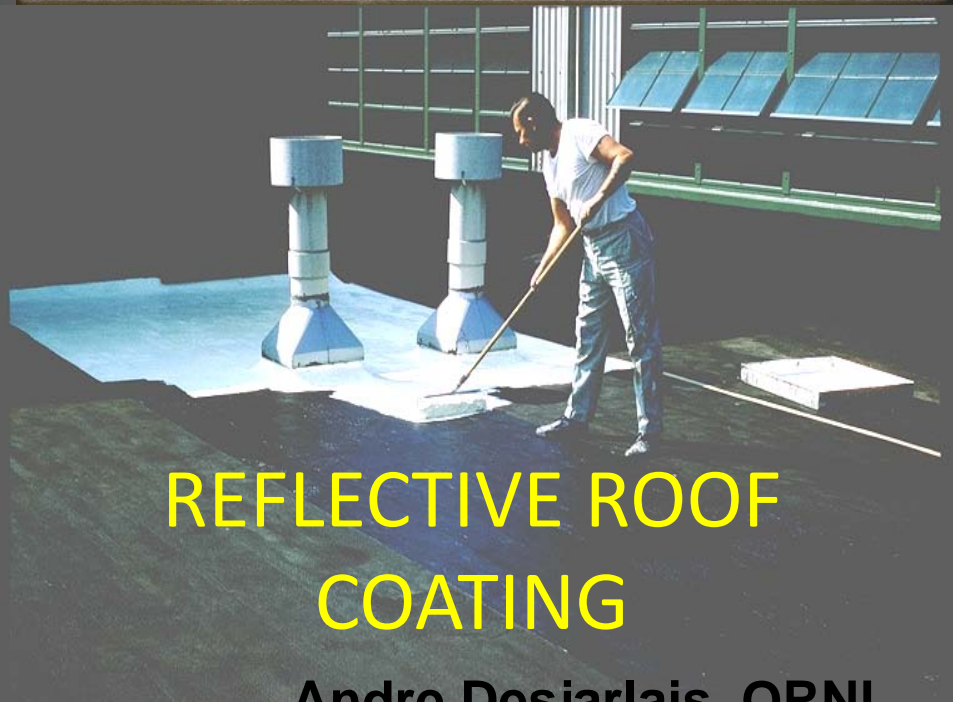
Protects against UV,
Heat, and traffic



GRAVEL/BALLAST



**GRANULE CAP
SHEET**

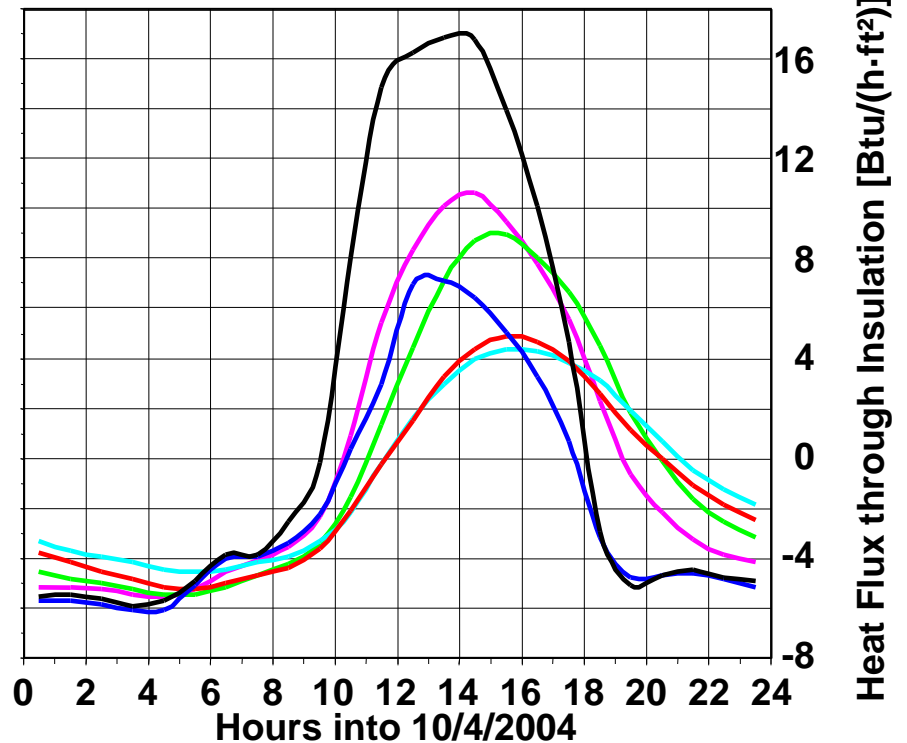
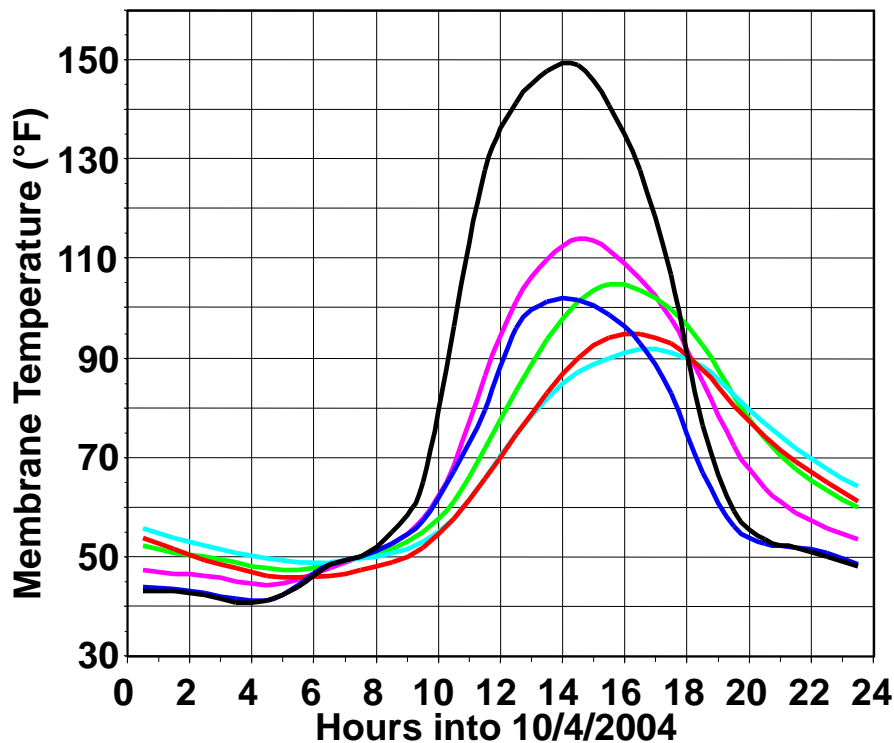


**REFLECTIVE ROOF
COATING**

Andre Desjarlais, ORNL

Test Results - Six Month Exposure Data

— Bare Black EPDM — Under 10 lb/ft² Stone — Under 24 lb/ft² Stone
— Bare White TPO — Under 17 lb/ft² Stone — Under Uncoated Paver



Building Green Chicago Chicago Energy Code

Section 18-13-101.5.4.1 – 3

Reflectance Value Requirements

1. New Construction - Meet or Exceed

.72 initial reflectance

OR

.50 3 yr. Aged reflectance

All Tested to ASTM E903; E1918



Building Green Chicago

Chicago Energy Code

Section 18-13-101.5.4.1 – 3

Reflectance Value Requirements

Exceptions

- **Ballasted Roofs – 15 lbs./sf Aggregate,** Minimum Ballast Reflectance, .30
- **Definition of Ballast** – “River rock, aggregate or larger, pavers, *or other means of weighing down* a roofing membrane over a substrate to resist wind uplift.”
 - 15lbs./sf Over Single Ply
 - BUR + Flood w/Gravel, **SYSTEM** totaling 15 lbs./sf meets
 - Pavers
- “Weighing Down” – Ballast, Membrane, Felts, Insulation, etc.

Building Green Chicago Chicago Energy Code



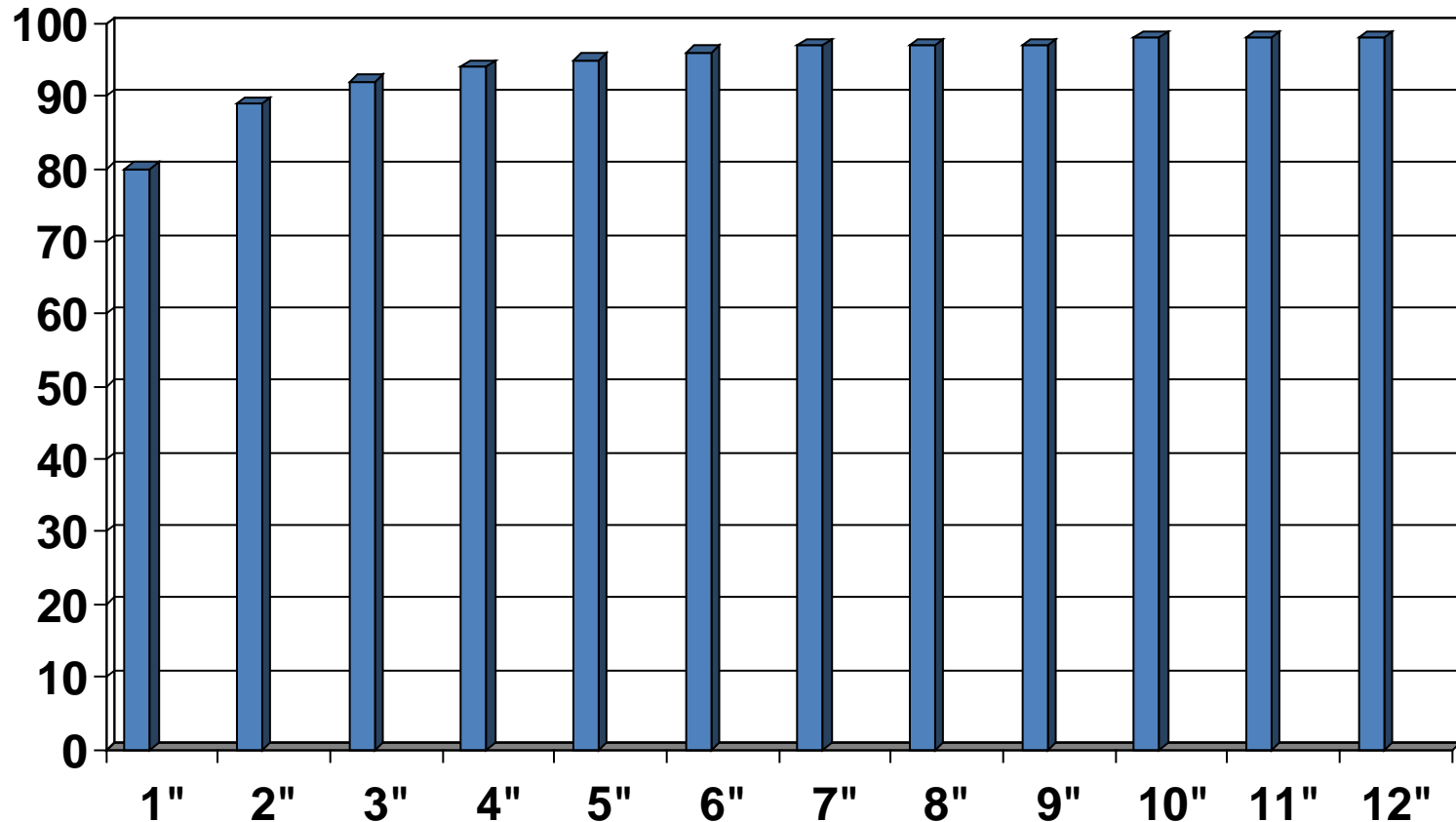
CRC Education - 'Rooftop Harvesting'

- ❑ Insulation Effect = Immediate, Identifiable
 - ❑ Reduce Heating Loads
 - ❑ Some Cooling Loads

- ❑ Study – Center for Innovation for Roofing
 - ❑ 100,000 SF Warehouse
 - ❑ R-15 to R-20 Insulation
 - ❑ Heating/Cooling bill reductions...

Insulation Diminishing Returns?

❑ Total Heat Flow Reduction with Increased Insulation Thickness (Massave.com)



Insulation Calculations?

- ❑ Oak Ridge National Labs, US DOE
 - ❑ http://www.ornl.gov/sci/roofs+walls/insulation/ins_07.html

- ❑ NRCA's Energy/Wise
 - ❑ <http://energywise.nrca.net/>

- ❑ Diminishing Returns at...

CRC Education - 'Rooftop Harvesting'

Why Chicago's Garden Roofs?

- ***Reduce Urban Heat Island Effect...and Water***
- ***Chicago's Landscape....***
 - Flat, Marshy Land
 - Heavy Clay Underbase, Glacial Lake Chicago
 - Poor drainage
 - Short, Sluggish Chicago / Calumet Rivers
 - Human Alterations
 - Shoreline Filled
 - City Raised
 - Reversed River Flow
 - New Lagoons, Ponds, Harbors
 - Suburbs = less drainage

» Source: Encyclopedia of Chicago



CRC Education - 'Rooftop Harvesting' Why Vegetative Green Roofs?

- **Energy Savings – R-20**
- **Mass Effect – Slow to Heat/Cool**



CRC Education - 'Rooftop Harvesting' Why Vegetative Green Roofs?

- **Urban Heat Island Effect Reduction**
 - **Earth Tone, Light Color**
 - **Reflectivity = Cool Chicago**



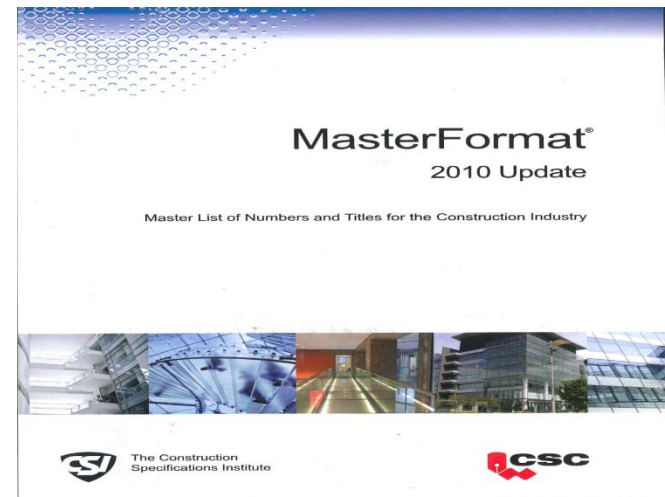
CRC Education - 'Rooftop Harvesting' Why Vegetative Green Roofs?

- **Adds Value to Building**
 - **More Usable Space....**
 - **Aesthetically Pleasing**



CRC Education - 'Rooftop Harvesting' How to Specify Green Roofs?

- **CSI/CSC's MasterFormat 2004 – 2010**
- **Reflective, Ballasted Green Roofs**
 - **07-50-00 – Membrane Roofing**
 - Overburden Specified as a System
 - '...and other items integral to the roofing assembly'.
- **Vegetated Green Roofs**
 - **Specifications Classified In Division 7, Roofs**
 - **07-33-63 - Vegetated Roofing**
- **PV & Solar Thermal Green Roofs**
 - **07-31-00 – Solar Collector Roof Shingles**
 - **48-14-00 - PV Solar Generating Equip**
 - **26-31-00 - PV Collectors 2**
 - **22-33-00 – Solar Water Collectors**
 - **References to 07-50-00...Wind, Fire, Warranty**



CRC Education - 'Rooftop Harvesting' Garden Roof Standards

- **ASTM Standards – Under Development**
 - **Wind Uplift**
 - NRCA Wind Study – Southern Illinois University
 - Official Results Pending
 - FM Approval Standard for Vegetative Roof Systems, Class 4477
 - ASTM still working on Wind
 - **Fire – No Testing Standards Yet....**
 - Testing occurring at UL



CRC Education - 'Rooftop Harvesting' Garden Roof Code Requirements

- **ICC Code Requirements –**
 - **2012 International Fire Code**
 - Wind, Fire Performance, per Chapter 15, Roofing
 - “Immediate removal of Dry Plants”
 - Fire Breaks every Approx. 15,000SF
 - NOTE: Chicago Municipal Code – 10,000 SF
 - **2012 International Building Code**
 - Wind, Fire Performance, per Chapter 15, Roofing

CRC Education - 'Rooftop Harvesting' Garden Roof Installation Critical

- **IT's ABOUT THE ROOF, and Everything else too!!**
 - **Roofing Contractor = Prime Contractor**
 - **Manage Roofing Construction Process**
 - **Culture of Roofer – Understands Working at Heights**
 - **Safety**
 - **Supervise trades on roof**
 - **WC & GL 'Roofer' Classification**
 - **Over 2,000,000 SF Above Grade**
 - **Roof that Doesn't Leak!**



CRC Education - 'Rooftop Harvesting' Garden Roof Installation Critical

- IT's ABOUT THE ROOF, and Everything else too!!
- **Single Source Warranty**
 - **Roofing System, Deck Up**
 - Roof, Protection Boards
 - Drainage/Water Retention Boards
 - Root Barriers, Irrigation System
 - Soils
 - Plants
- **One Roof, One Call - Chicagoland's Professional Roofing Contractors & Local 11 Workforce**



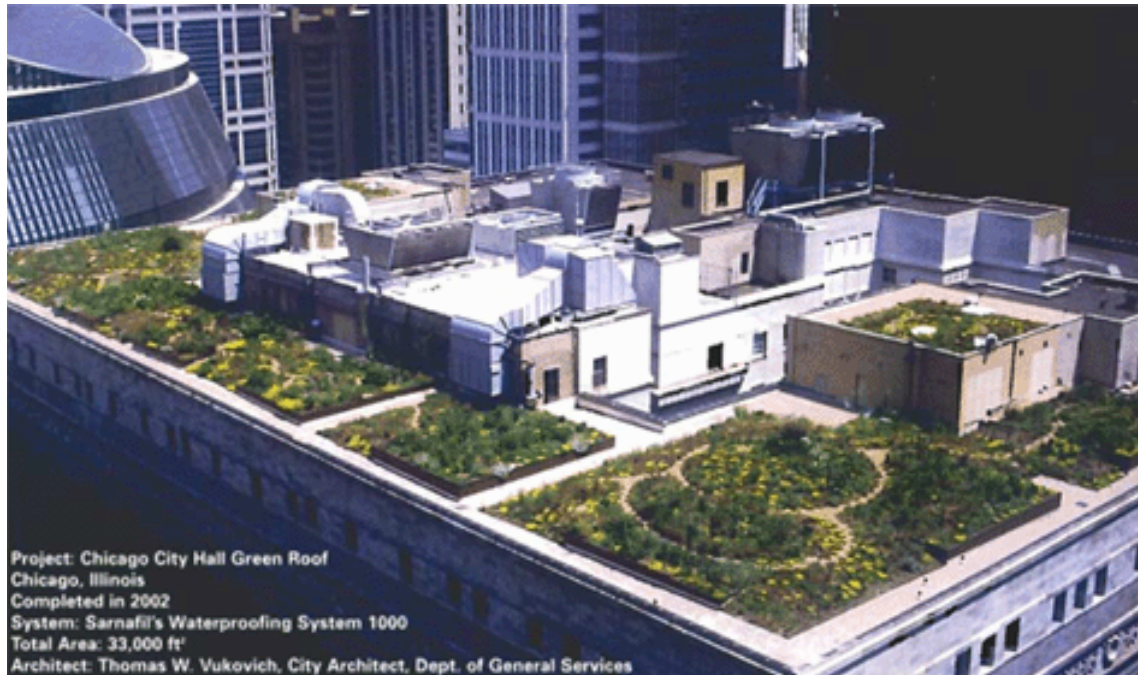
CRC Education - 'Rooftop Harvesting' Garden Roof Installation Critical

- **One Roof, One Call, Single Source**
 - Licensed as Roofing Contractors, Safe Workforce



CRC Education - 'Rooftop Harvesting'

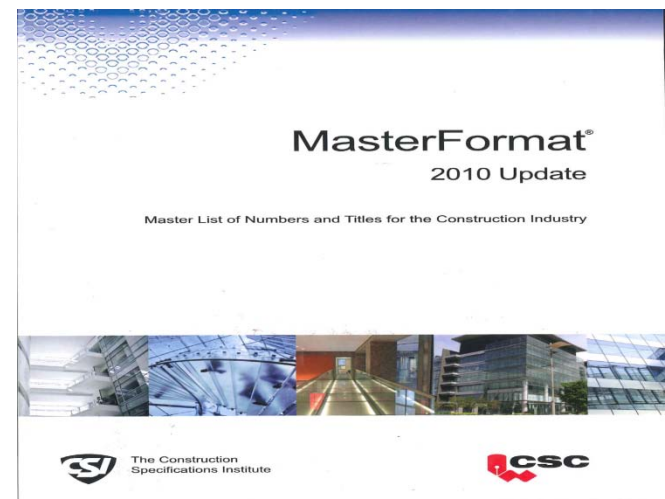
SOLUTION: Garden Roofs for Chicago



Project: Chicago City Hall Green Roof
Chicago, Illinois
Completed in 2002
System: Sarnafil's Waterproofing System 1000
Total Area: 33,000 ft²
Architect: Thomas W. Vukovich, City Architect, Dept. of General Services

CRC Education - 'Rooftop Harvesting' How to Specify Green Roofs?

- **CSI/CSC's MasterFormat 2004 – 2010**
- **Reflective, Ballasted, Vegetated, PV, Solar Thermal Green Roofs**
 - **07-50-00 – Membrane Roofing**
 - Overburden Specified as a System
 - '...and other items integral to the roofing assembly'.
- **PV & Solar Thermal Green Roofs**
 - **07-31-00 – Solar Collector Roof Shingles**
 - **48-14-00 - PV Solar Generating Equip**
 - **26-31-00 - PV Collectors 2**
 - **22-33-00 – Solar Water Collectors**
 - **References to 07-50-00...Wind, Fire, Warranty**
- **Wind Power Generating Equipment**
 - **48-15-00**



CRC Education - 'Rooftop Harvesting'

How to Specify Green Roofs?

- **However....**
 - **ICC International Building Code**
 - **International Existing Building Code**
 - **International Fire Code**
 - **Roof – References IBC Chapter 15 & 16**
 - **Reference PV, Solar Thermal ON ROOFS**
 - » **07-50-00...Membrane Roofing**

CRC Education - 'Rooftop Harvesting'

Photovoltaic & Solar Thermal

- Payback Period & Roof Life

Building & Fire Code Requirements

- Fire Resistance

- Wind Uplift

Panels & Roof Compatibility

- Dark Color & Roof Effect

- Age of Roof Membrane

Research...

- <http://www.sri-engineering.com/mrca/>

- Payback??

Investments

- Dow Chemical – Residential Shingles

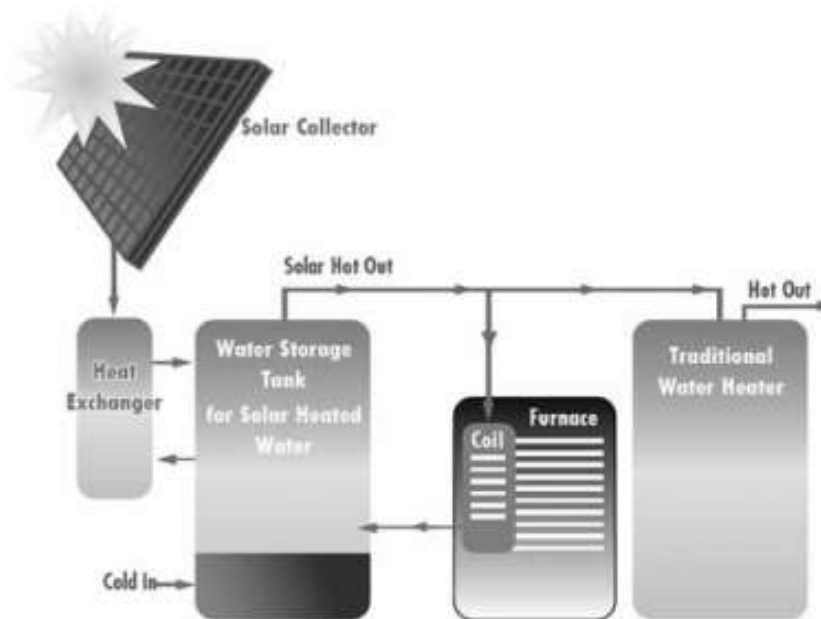
- GE – Power Inverters...

- MRCA Photo



CRC Education - 'Rooftop Harvesting'

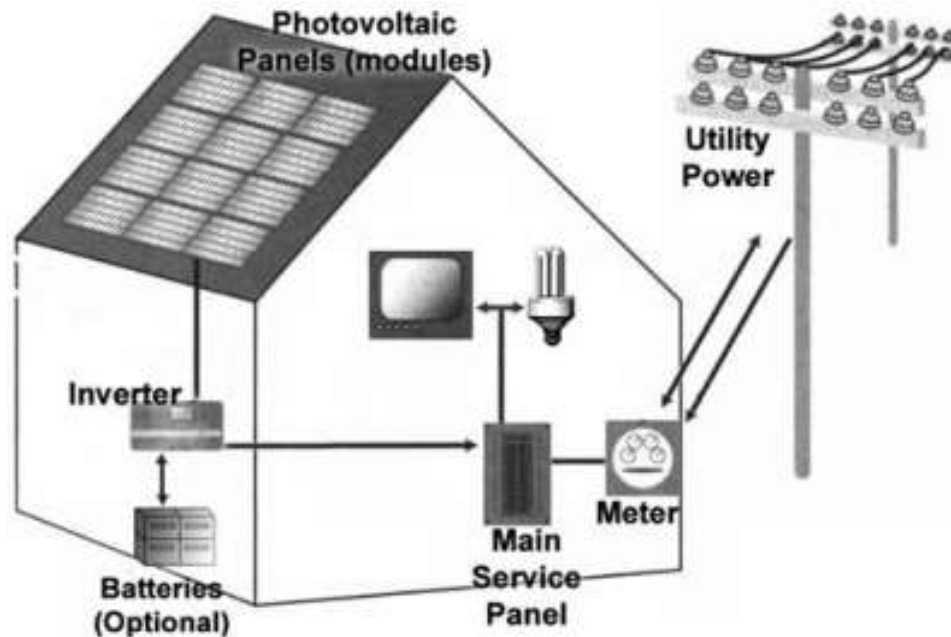
- Solar Thermal Collectors Heat Water, send to heat exchanger, to water tank, then used for hot water, radiant heat.
- Flat Plate Collectors – Aluminum Boxes with tempered glass, liquid, heats up to 180F
- Evacuated tube collectors – Rows of transparent glass tubes.
- Outdoor Swimming Pools –



- Source: Tour.Illinoissolar.org

CRC Education - 'Rooftop Harvesting'

- Solar Electric – Photovoltaic
 - Solar Panels – Semiconductor Materials convert sunlight directly to Electricity



- Source: Tour.illinoissolar.org

CRC Education - 'Rooftop Harvesting'

- Solar Electric – Photovoltaic
 - Solar Panels – Semiconductor Materials convert sunlight directly to Electricity
 - Utility Grid Interconnected
 - No Battery Storage
 - Buys power on cloudy days
 - Off-Grid – Independent
 - Battery storage for later use.
 - \$\$, Fire Resistance Rated Rooms
 - Grid –Tied with Battery Backup – 'bi-modal'.
 - Both, Batteries, Grid

CRC Education - 'Rooftop Harvesting'



GE's Solar Carport - Rooftop Charging Station, for Electric Vehicles – April, 2011



Dow Chemical's 'POWERHOUSE' Solar Shingles – Announced 2009

CRC Education - 'Rooftop Harvesting'

- Wind Turbines on Roofs
 - Technologies?
 - Water, Ice, Roof Wind Turbulence
 - Aesthetics?
 - Payback Period vs. Roof Life?
 - Code – Chapter 15 & 16 IBC
 - Wind Uplift
 - Fire Resistance...
- Links?
 - <http://www.wind-works.org/articles/RooftopMounting.html>
- Do your own research...



CRC Education- 'Rooftop Harvesting'

- Professional Licensed
CRC Roofing Contractor has...
 - A Culture of Safety
 - Experience with materials, systems, scope
 - Expertise
 - Education
 - Involved in Industry...



CRC Education - 'Rooftop Harvesting'

- CRC Member Contractors

- <http://www.Chicagoroofing.org> –

- CRC Member List
 - Education
 - Licensing Law
 - Resources for Chief Engineers
 - Trade Show
 - CRC Education Sessions

- IL Licensed Contractor List

- <http://www.idfpr.com/dpr/who/roof.asp>



CRC Education - 'Rooftop Harvesting'

- *CRC Members...*
- **One Call, Single Source Responsibility**



CRC Education – ‘Rooftop Harvesting’

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- *Rooftop Harvesting Options*



CRC Education 'Rooftop Harvesting'



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