# Welcome to the Downers Grove Solar Panel Workshop

**Hosted by:**

**Village of Downers Grove, Downers Grove Public Library, Downers Grove Park District, District 58, & District 99**

# Agenda

- Welcome & Introductions
- Peter Gorr
- Alex Pellicano
- Brandon Thiele
- Lucille Carney and Laura Kamedulski
- Ryder May
- Mark Handy
- Q&A

# Does Solar Energy Make Sense?
## (or should we spell that "c-e-n-t-s")

Illinois Solar Energy Association
Peter Gorr – Member

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# Illinois Solar Energy Association (ISEA)

The ISEA mission is to educate and advocate for the widespread application of solar, wind and other forms of renewable energy to the people of Illinois.

- Established in 1975
- 501(c)3 charitable organization
- Chapter of the American Solar Energy Association (ASES)
- Membership based organization
- Hosts the annual IL Solar Tour as part of the National Solar Tour

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# Agenda

- Why Clean Renewable Energy
- Solar Myths
- Solar Basics
  - Technologies
  - Finances
- The Process

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# Motivations

- Environmental
- Patriotic
- Financial

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# Unwanted Energy Deliverables

acid rain
air pollution
black lung
cave-in
cancer causing
clean-up
climate change
death
embargo
explosion
extinction


greenhouse gas
habitat destruction
hazardous waste
health issues
leak
meltdown
Mtn top removal
radiation
spill
strip mining
water pollution

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# "Negative Externalities"

acid rain
air pollution
black lung
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death
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greenhouse gas
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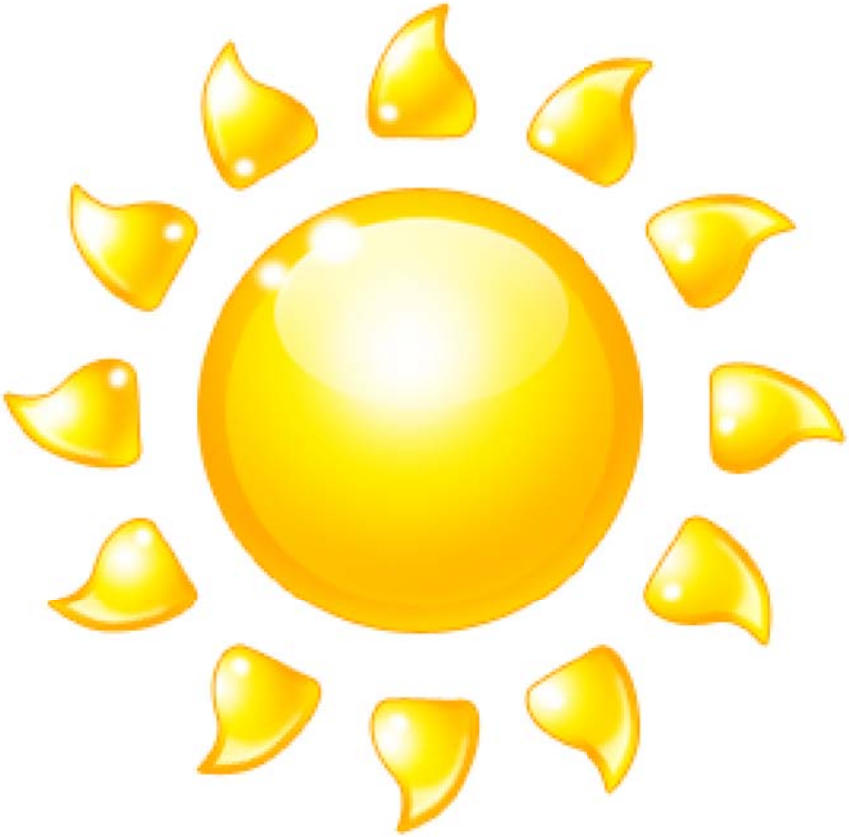
# “Negative Externalities”



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# Patriotic

- All Investment stays in USA
  - Sale by local dealer
  - Installation by local dealer
  - Manufacture in US factory
- Creates new, safe jobs
  - Old dangerous fossil fuel jobs will need to transition
  - Net new jobs added
- Energy Investments in hostile foreign countries eliminated

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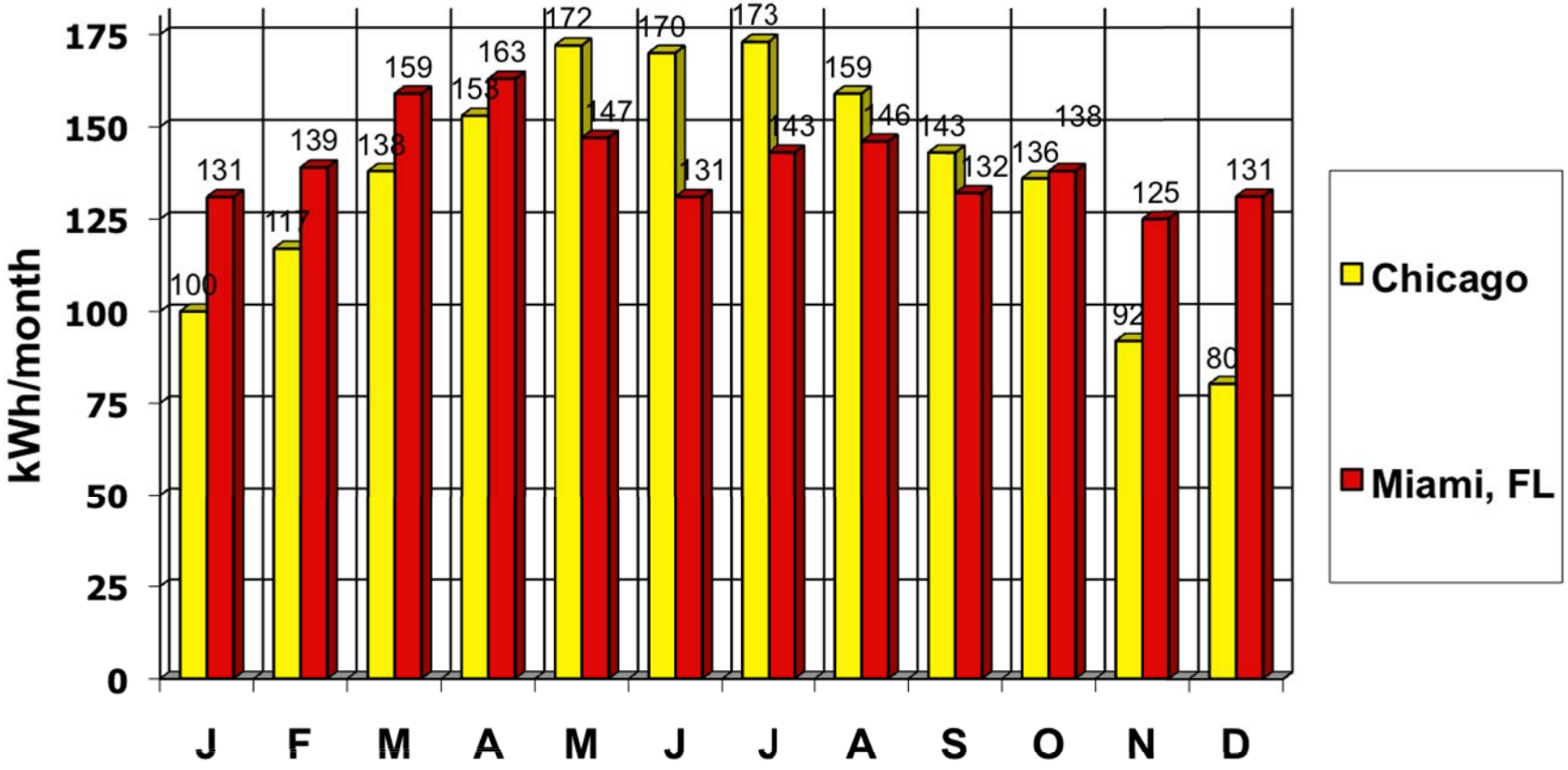
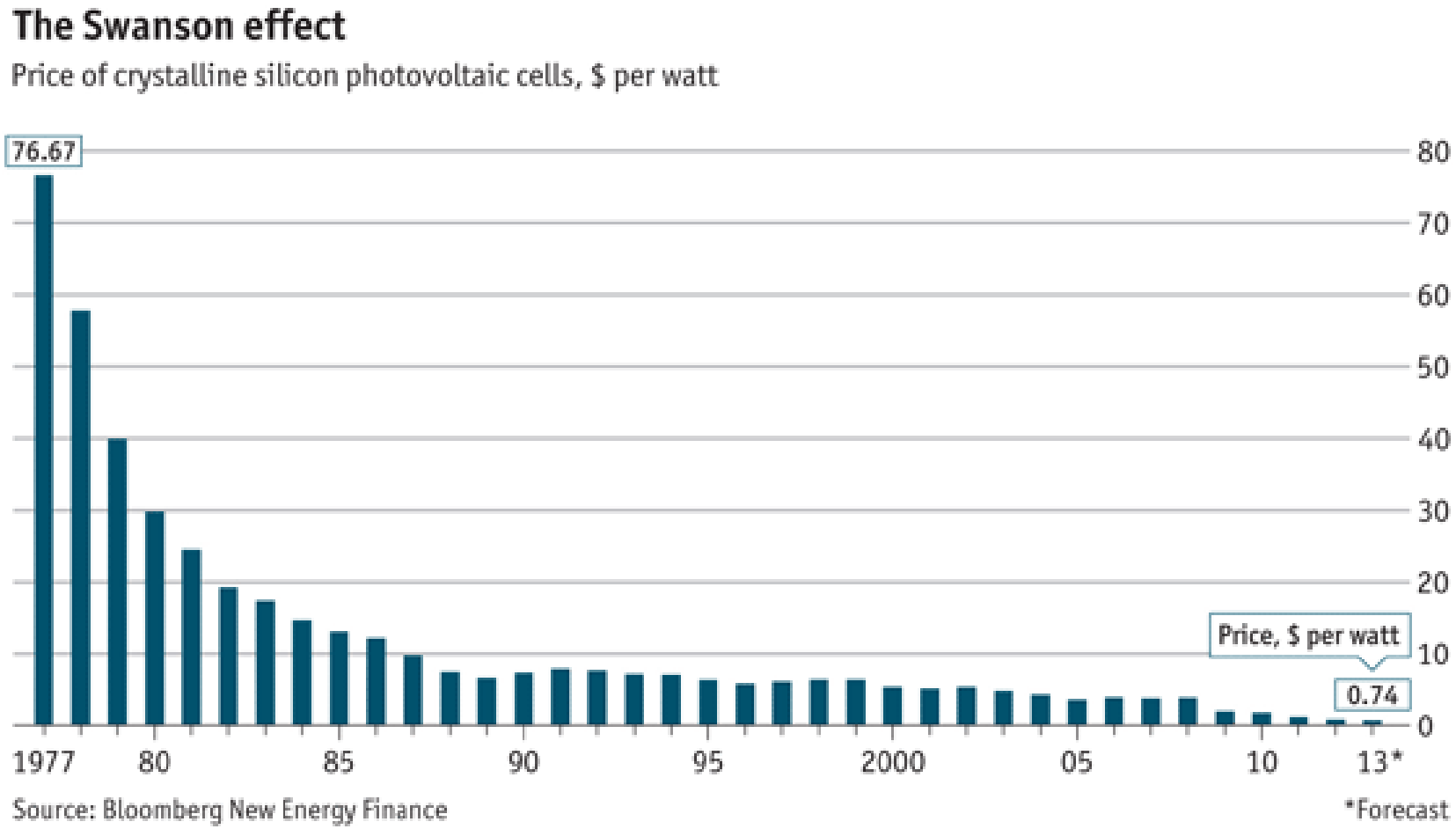
# Solar Myths

- Too Cold/Cloudy
- Too Expensive
- Too Complex

# Chicago Outperforms Miami in Summer



# Too Expensive?




Economist.com/graphicdetail

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# Incredible Government Incentives

- 25% or$1.5/watt
- Capped at $10,000
- Self funded, limited funds
- Legislated until 2015
- 1st come 1st serve – fall awards

## State Incentives

- 30% unlimited Tax Credit
- Legislated until 2016
- Can do in Turbo Tax!

## Federal Incentives

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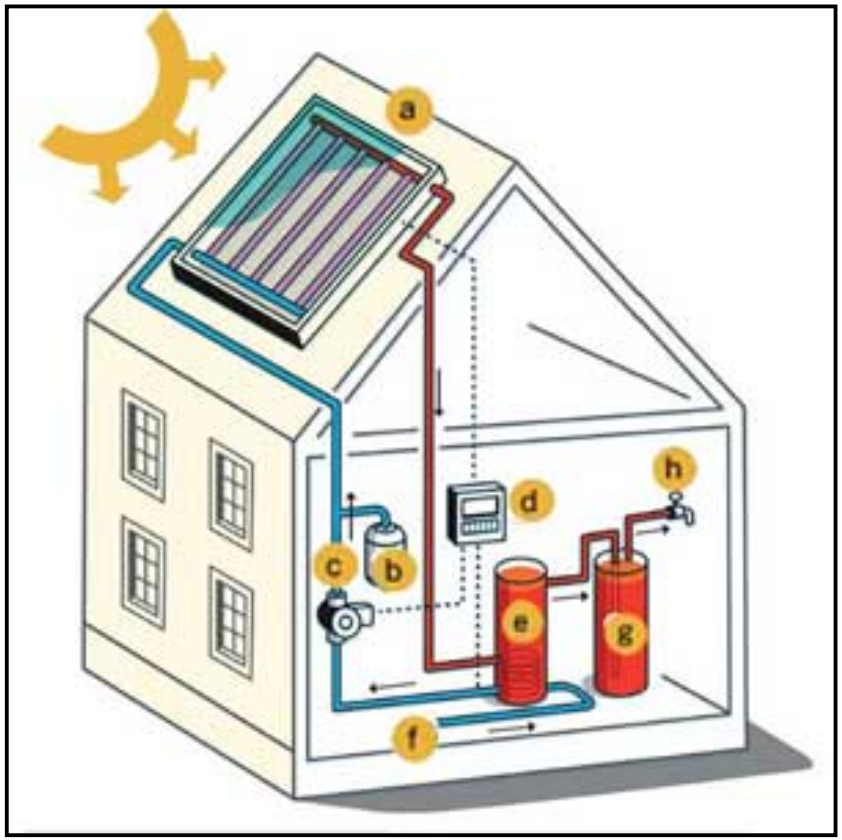
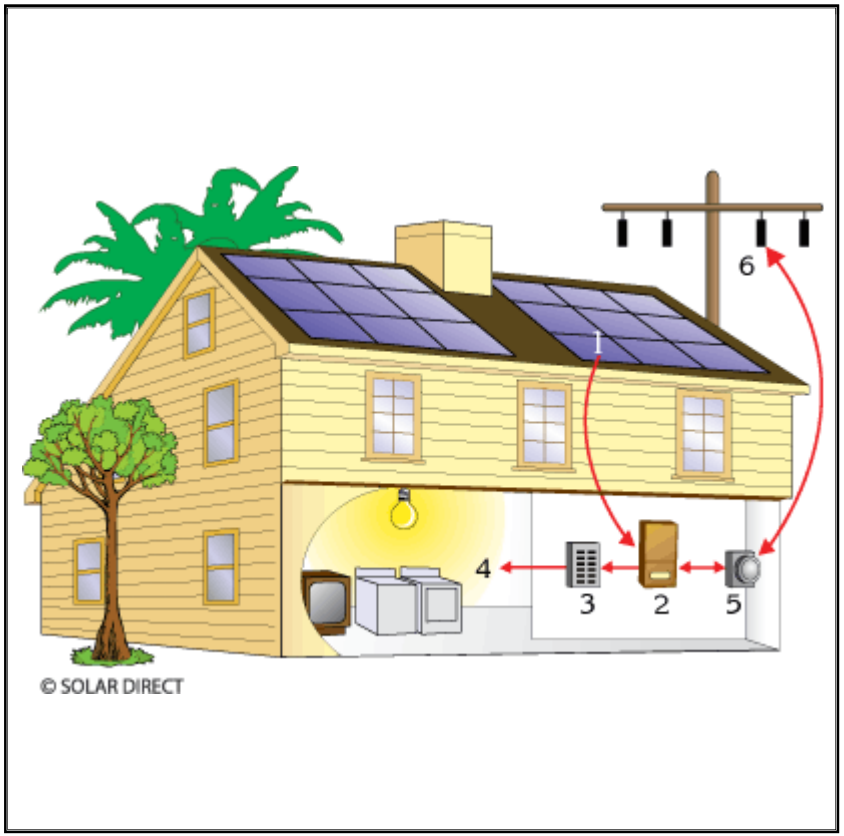
# Too Complex?




Solar Hot Water

Solar Electricity (PV)

Campbell, ThisOldHouse.com

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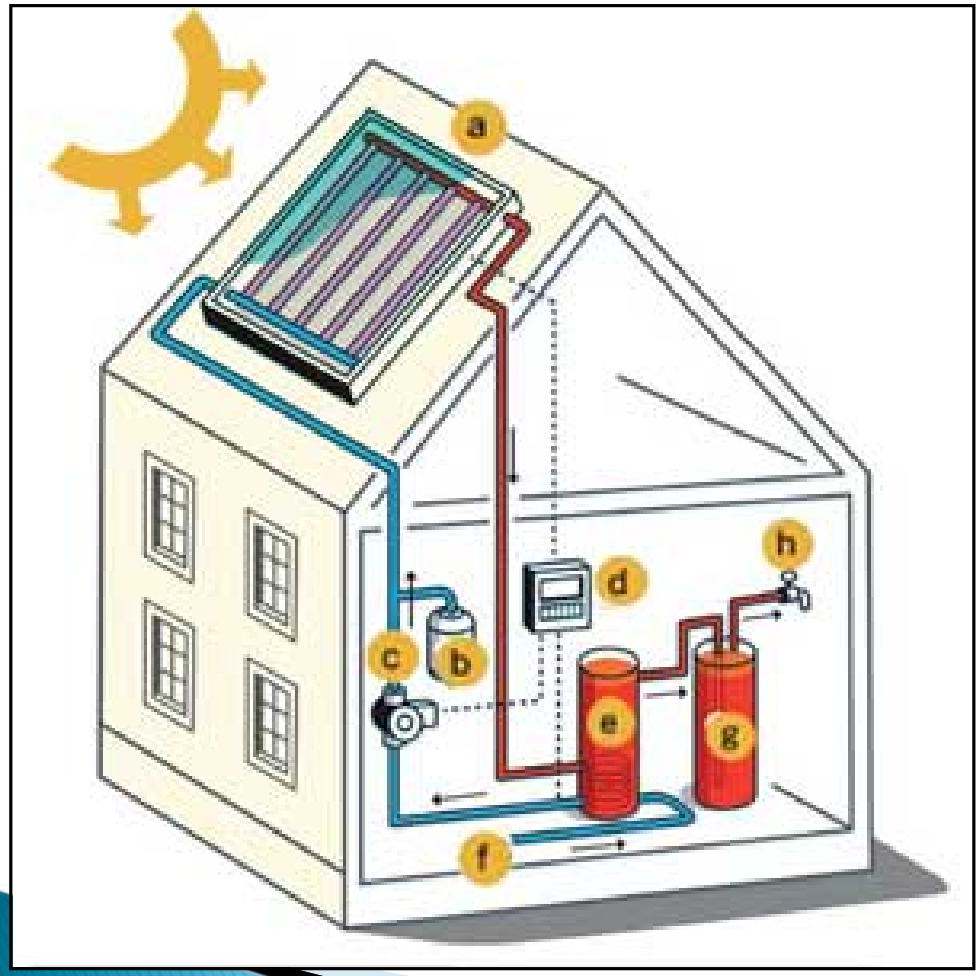
# Solar Hot Water (Thermal)




Primary Components

a) Thermal collectors
b) Heat Exchanger
c) Circulation Pumps
d) Solar Control
e) Solar Storage Tank
f) Incoming Water Supply
g) Conventional Water Heater
h) Hot Water Supply

Thermal illustration: Harry Campbell, ThisOldHouse.com

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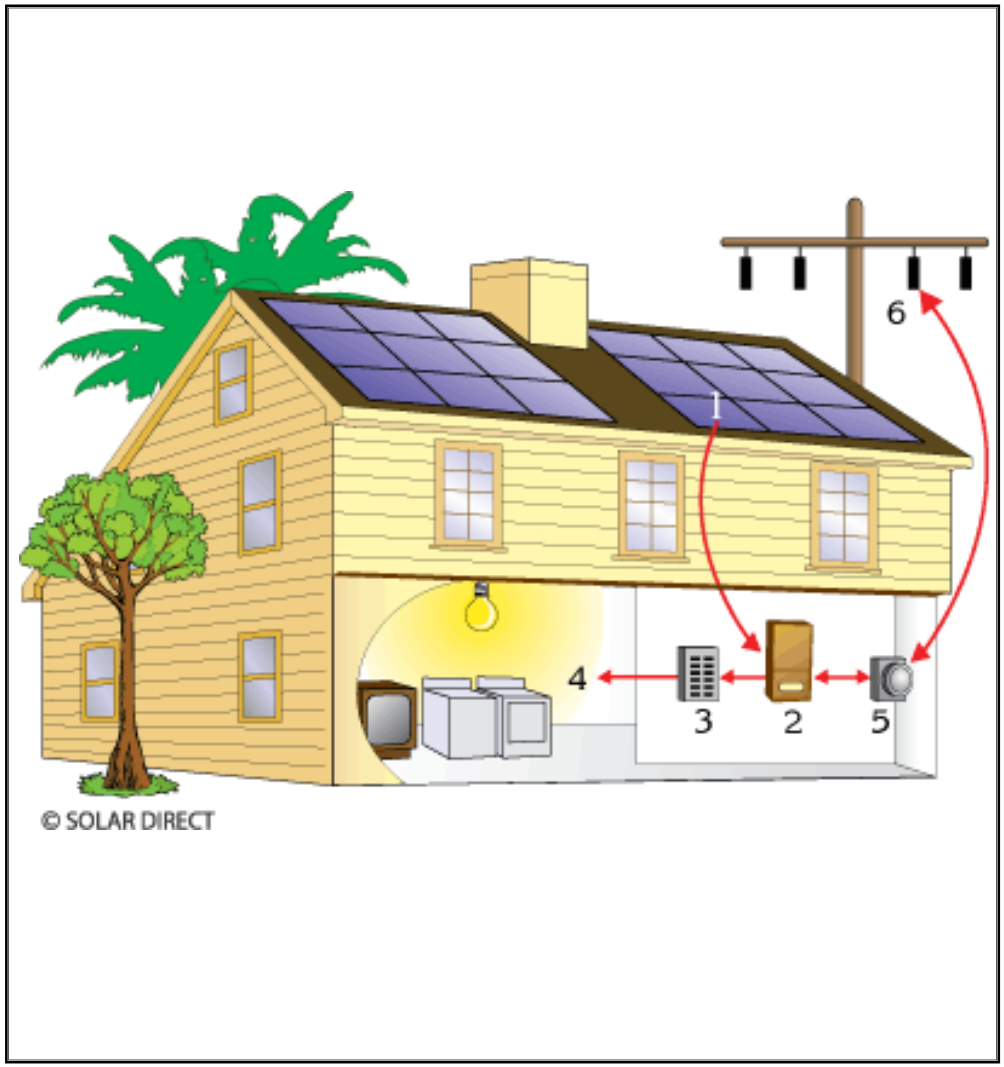
# Solar Electricity – Photovoltaic (PV)

Primary Components

1) PV collectors
2) Inverter or
   Micro-Inverters
3) Service Panel
4) Household Load
5) Electric Meter
6) Grid & Net Metering




SolarDirect.comc

# Net Metering

- When I generate more energy than I need, it goes out on the grid and I receive a credit
- When I use more energy than I produce I pull it off the grid and pay for it
- At the end of the month I pay for the extra I needed or receive a credit for the extra I produced
- Credits roll over up to 12 mo then start over

# Sizing & Pricing A System

5KW Array – (20) 250 Watt Modules

- $6.00 – $5.00 per Watt

| | |
|---|---|
| $30,000 – $25,000 | Price Range Before Incentives |
| ($ 7,500 – $ 6,250) | Less Possible State Rebate |
| ($ 9,000 – $ 7,500) | Less 30% Federal Tax Credit |
| $13,500 – $11,250 | Possible Net Installed Price |

Note: State Rebate = 25% or $1.50 per watt, which ever is the lessor

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# "What's the Payback Time?"

"My Net Worth increased the day I flipped the switch"

+ Initial Cost
- State Rebate
- Federal Tax Credit
+ Out of Pocket Expense

- Electricity Savings
- SREC Sales
- Increase in Home Value
+ Year One Positive Net Worth Growth

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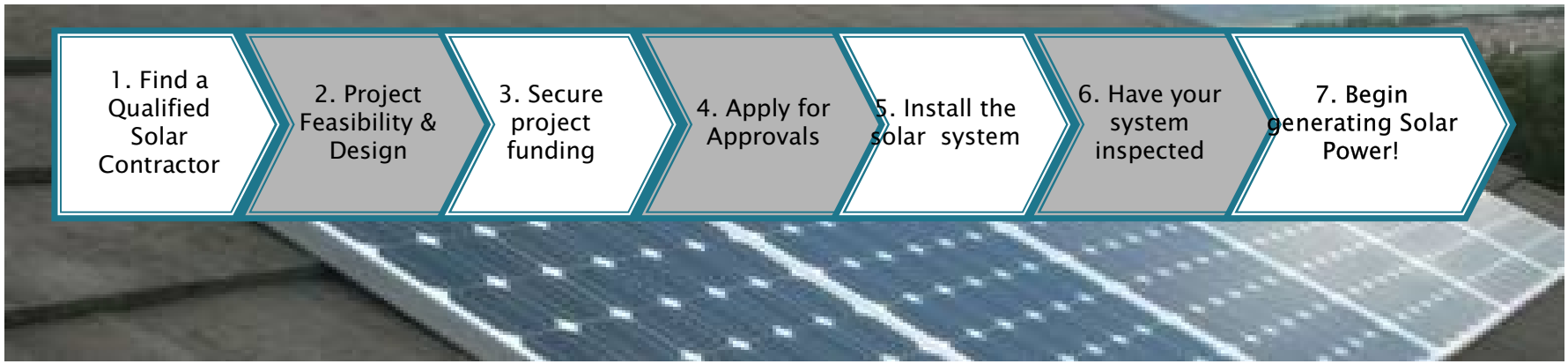
# Red Tape

- Sizing & Design
- Permit & Inspection
- ComEd Interconnection
- ComEd Net Metering
- State Rebate
- Federal Tax Credit
- SREC sales

# The Process

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# Financing a System

- Home Equity Line Of Credit / Home Equity Loan
- Refinance a First Mortgage
- Lease
- Direct Vendor Financing
- Shared Renewable System/Community Solar
- Property Assessed Clean Energy (PACE)
  - PACEnow.org

# Solar Makes Sense (and Cents!)

- Free, unlimited power source
- Excellent, reliable investment & ROI
- Clean, safe energy
- National Energy independence
- Save on energy bills
- Hedges against future energy prices (inflation)
- Reduces your carbon footprint
- Conserves natural resources
- Increases Home Value
- Solar is AFFORDABLE

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# Questions & Contact Info

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- ☑ Website: www.illinoissolar.org
- ☑ Contact us: info@illinoissolar.org

# Solar Renewable Energy Credits (SRECs)

- Market development mechanism
- Environmental benefits claim for renewable energy production
- SRECs bought by utilities or companies either mandated or who desire to receive credit for using renewable energy
  - IL RPS (25% renewables by 2025)
- One SREC for every MegaWatt produced
- Price is market driven (Supply – Demand)

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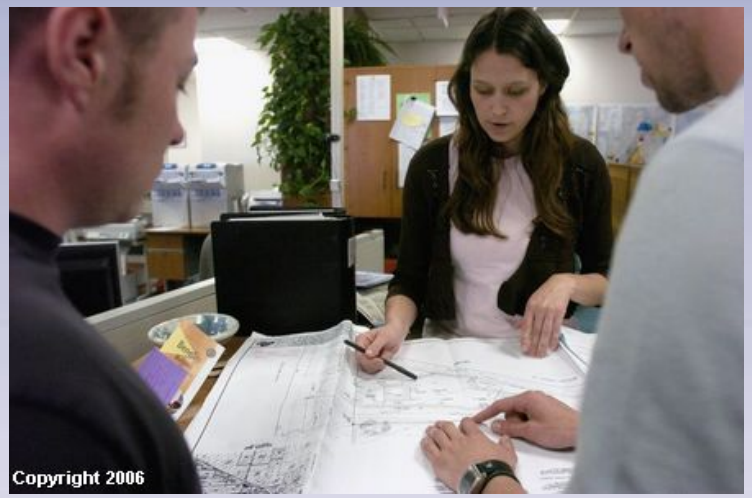
# Solar Panel Workshop

## *Community Development Department*

**Alex Pellicano – Building Division Manager**

**November 18, 2013**

# Community Development Department




Review Permit Submittals

Conduct Inspections

# Permit Submittals

- Permit Application
- Drawings & Specifications
- Contractor's License

# Permit Submittals

- Permit Application
  - Available Online or at Village Hall
  - http://www.downers.us/public/docs/permits/Permit_Application.pdf
  - Contact Information
  - Estimated Value of Construction

*We are eager to help you through the process so at any point we encourage you to give us a call or stop by Village Hall for assistance*

# Permit Submittals

- Drawings & Specifications
  - **Drawings:** Indicate location and size of installation.
  - A marked up copy of an existing Plat of Survey is ideal.
  - **Specifications:** Manufacturer's data sheets indicating the characteristics of the products to be installed.

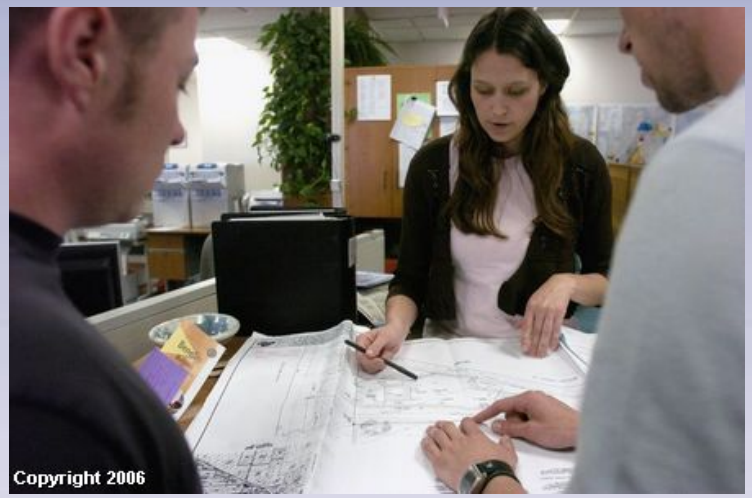
*This information is critical to ensure your installation will meet all applicable Zoning ordinances & Building Codes*

# Permit Submittals

- Contractor's License
  - Valid Electrician's License
  - Valid Illinois Plumber's License (if applicable to scope of work)

*This ensures that qualified personnel are taking responsibility for the work to be done.*

# Community Development Department




Permit Submittals Review

# Permit Submittal Review

- Project Manager (PM)
  - Application Assigned to a Community Development Project Manager - your single source of contact for your project.
  - She coordinates with all staff involved and conducts **Building Code** review.
  - Planner simultaneously conducts **Zoning Ordinance** review.

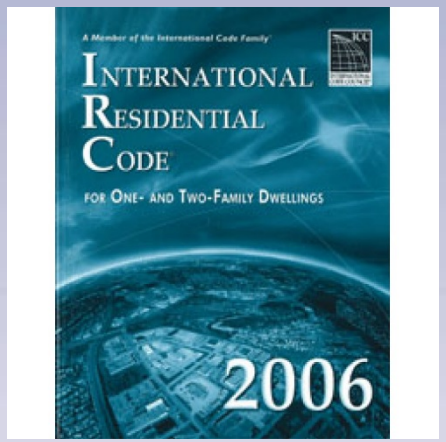
# Permit Submittal Review

- Building Code & Zoning Ordinance Review

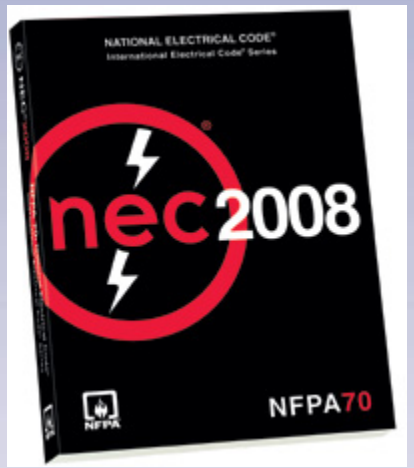
**Zoning**

New Zoning Ordinance currently under draft review, all info subject to change

Zoning Ordinance



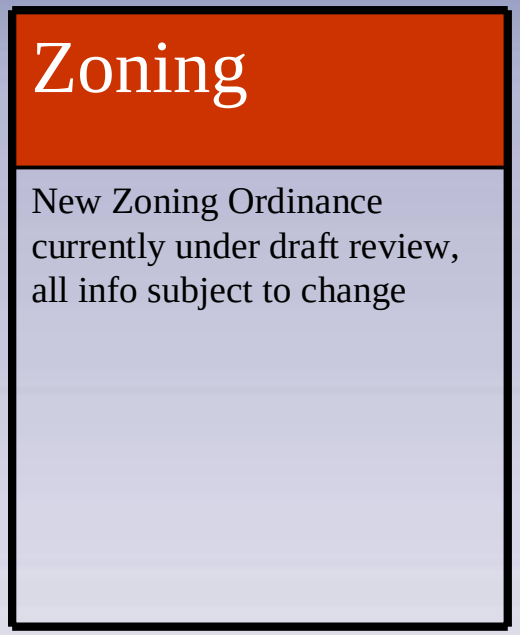

Building Codes




Electrical Code

# Permit Submittal Review

- Zoning Ordinance Review




Zoning Ordinance

# Permit Submittal Review

- Zoning Ordinance Highlights – Mounting
  - **Solar Energy Systems – Building Integrated:** Integral part of principal or accessory structures which replaces or substitutes for an architectural or structural component.
  - **Solar Energy Systems - Flush mounted:** Attached to principal or accessory structures, flush with finished building surface (6” max. above surface)
  - **Solar Energy Systems - Ground Mounted:** Secured to the ground and not attached to any structure.

# Permit Submittal Review

- Zoning Ordinance Highlights – Mounting

Building Integrated

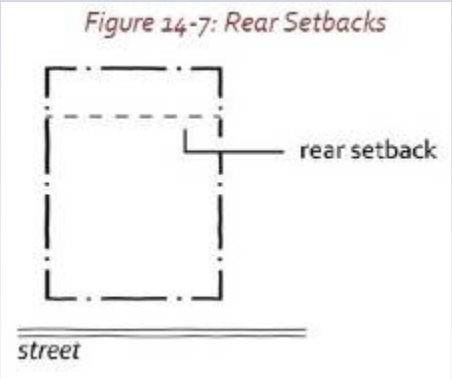
Flush Mounted

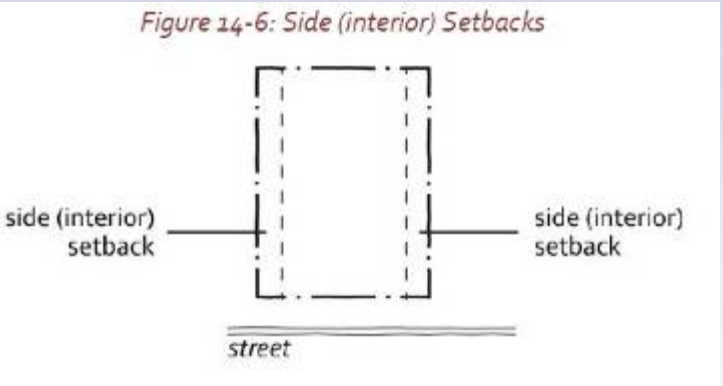
Ground Mounted

Non-Flush Mounted

# Permit Submittal Review

- Zoning Ordinance Highlights - Location
  - All applicable setback regulations apply to building–mounted and ground mounted solar energy systems, including encroachment allowances
  - Only flush-mounted systems may be installed on street facing building elevations.

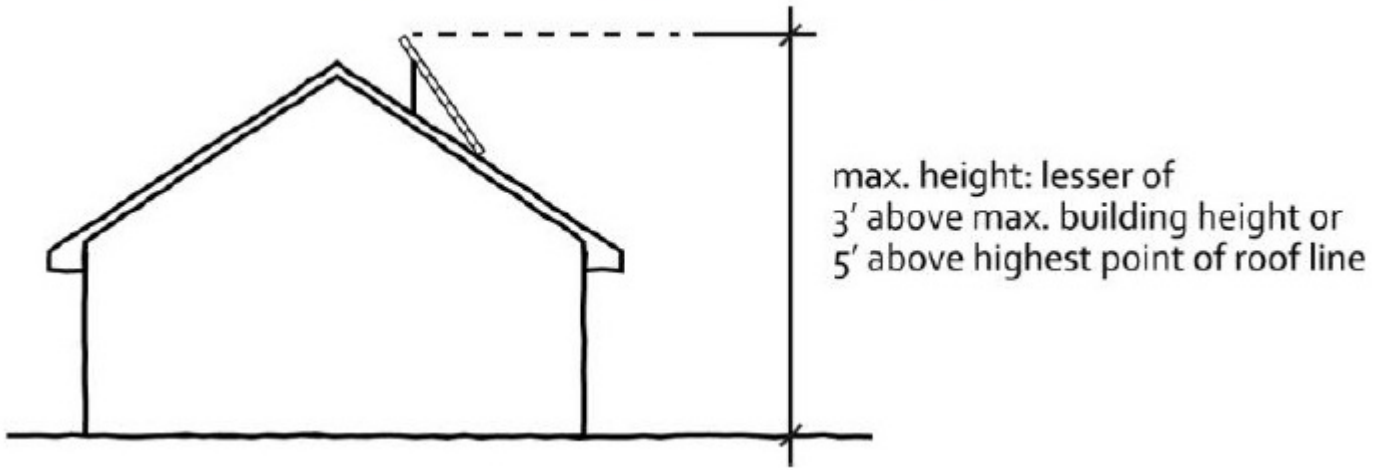


# Permit Submittal Review

- Zoning Ordinance Highlights - Height
  - Solar energy sytems may not extend more than 3 feet above applicable maximum building height limit or more than 5 feet above highest point of roof line, whichever is less.

*Figure 6-4: Maximum Solar Panel Height*



# Permit Submittal Review

- Building Code & Zoning Ordinance Review

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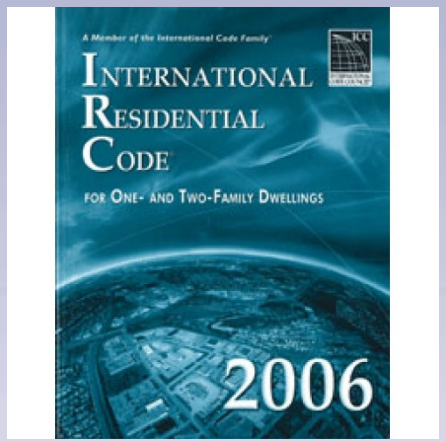
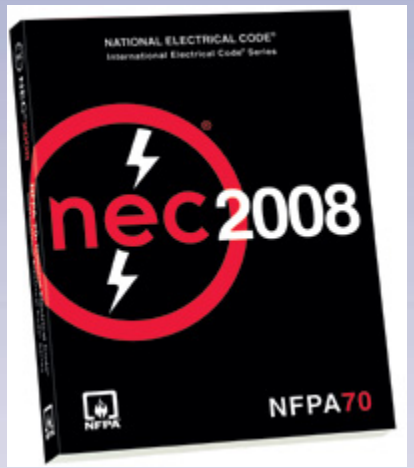


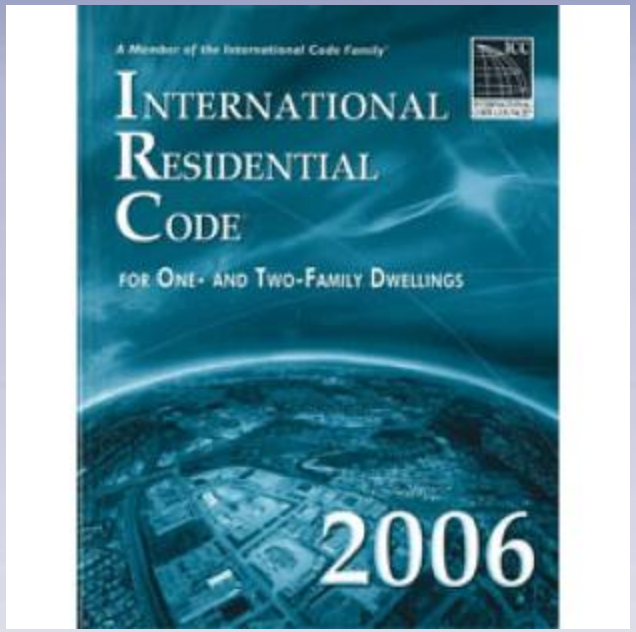

Building Codes




Electrical Code

# Permit Submittal Review

- Building Codes – I.C.C. & Others




Building Code

# Permit Submittal Review

- Building Codes
  - 2006 International Code Council (ICC) Codes as adopted and amended by Village of Downers Grove. (2012 International Energy Conservation Code)

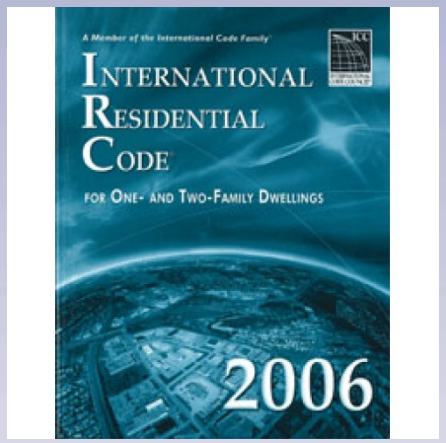
# Permit Submittal Review

- Building Code & Zoning Ordinance Review

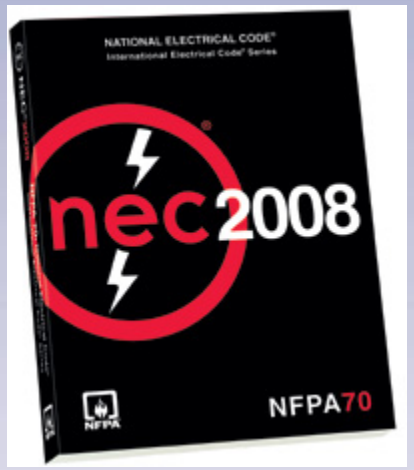
## Zoning

New Zoning Ordinance currently under draft review, all info subject to change

Zoning Ordinance



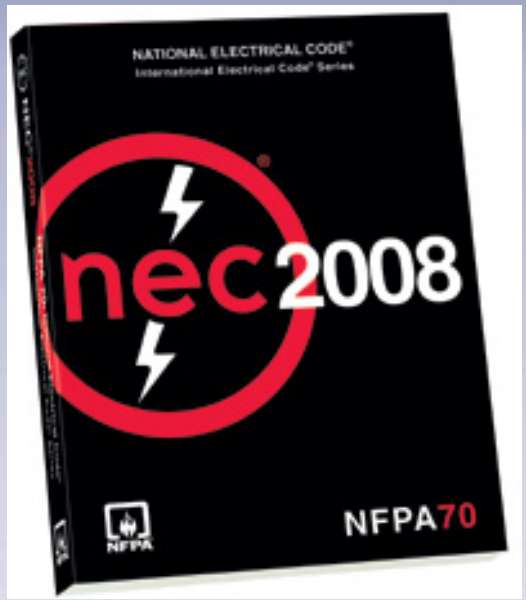

Building Codes




Electrical Code

# Permit Submittal Review

- Building Code – N.E.C Review




Electrical Code

# Permit Submittal Review

- Electrical Codes
  - 2008 National Electrical Code (NEC) as adopted and amended by Village of Downers Grove.
  - Article 690 – Solar Photovoltaic System

# Permit Submittal Review

- Project Manager (PM)
  - PM coordinates any and all review comments into a single response letter to applicant.
  - If corrections are required applicant resubmits and a second final review is completed.
  - PM creates Approval letter and Building Permit is issued, applicable fees are collected.
    - $84 for electrical permit only, if plumbing is included in scope add'l fees apply.
  - PM continues to track project through inspections and final permit closeout

# Permit Submittal Review

- Timeline
  - First review by Village completed within 10 business days.
  - Second review (if needed) within 5 business days
  - This type of permit rarely needs a second review, may require missing submittals at time of permit pickup.

# Community Development Department

Inspections

# Inspections

Call Community Development Inspection Hotline to schedule

(630) 434-5529

- Electrical Final inspection
- Plumbing Final inspection

  (if applicable)

# Questions?

**Alex Pellicano**
Ill. Licensed Arch. #001018517
Building Division Manager
Village of Downers Grove
apellicano@downers.us
(630) 434-5516

http://www.downers.us/govt/departments/community-development

# Solar in the land of trees: My adventures with Photovoltaic Energy

Brandon Thiele

Chicago Energy Consultants

bt@ChicagoEnergyConsultants.com

# About me

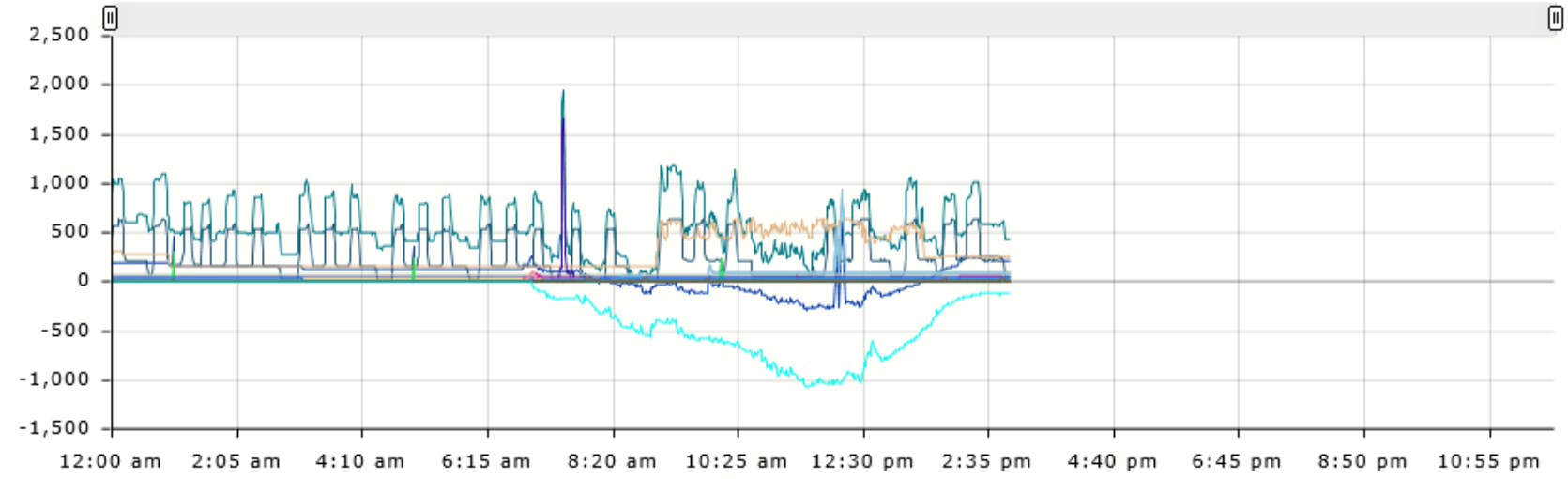
- I’m an energy auditor (HERS Energy Rater / Building Performance Institute)
- I sit on the board of the Illinois Association of Energy Raters
- Lived in a house in the big city (in the shadows of big buildings) till December 2012
- We went from site assessment to final inspection in 3 months (Oct 2012 – Jan 2013)

# Before Solar…

- Conservation is much cheaper: If your home and appliances are wasting energy, you'll be better off spending money on some other conservation measures first.  No point in harnessing energy to throw it away.
- "If you cannot measure it, you can not improve it" – Lord Kelvin
- Consider a whole home energy monitoring system

Refresh | Previous Day | Next Day | 11/13/2013 | Select Date | Loading...

chart by amcharts.com




- Main-L
- Main-L Gen
- Main-R
- Main-R Gen
- AHU
- LR-FP-BSMT-QUAD
- BSMT-SVC
- Garage
- Kitchen GFI
- M. Bath GFI
- Kitchen GFI
- Kitchen Sink
- Dishwasher
- Hot Tub
- Purple Bathroom
- Kitchen Lights
- Mud Room GFI
- Power Room GFI
- BSMT-lights
- Sump
- MBR+ERV+Back Yard
- Kitchen GFI
- Microwave
- Ejector Pump
- Bed #1
- Bed #2
- 25
- Smoke / CO Det
- General Lighting
- 28
- A/C
- Family Room
- M. Bath Lights
- PV
- PV Gen
- RET
- SUP
- H2O
- Water
- Pulse 2
- Pulse 3
- Pulse 4
- Voltage

# Energy Improvements

- 90% LED lighting
- All energy star appliances (look for the best performing appliances in online spreadsheets)
- Switched to laptop computers rather than desktops
- Retrofitted high-efficiency (ECM) motor into furnace
- Installed Energy Recovery Ventilator

# Steps involved

- Site Survey: Determines feasibility of system, and can help determine the type of system to use
- System proposal & selection (Grid Tie, etc)
- Illinois grant application
- Engineering inspection: Ensuring that roof can handle the wind load of the proposed system
- Permitting
- Install
- Commissioning & Final Inspection

# Our Project Challenges

- We have lots of old, tall trees around the property
- There is limited south facing roof space
- Timing the install for the purposes of grant money approval and availability
- Sourcing American made equipment when possible
- Making a sensible investment- Payback in under 15 years, 10 preferred.

# Problem: Shade / Roofspace

- Regular PV systems are severely impacted by any shading. Groups of panels (called strings) all operate in lock-step with each other.. If one slows down due to shade, so do the rest.
- Micro Inverters (a small DC to AC converter for each panel) can solve this, but add expense.
- Strings of panels all need to face the same direction, making for complex combinations of inverters and panels.


Google earth

# The solution: solar edge

- ‘Optimizer’ allows each panel to produce at its maximum level.  It is a DC to DC converter that is fixed to the back of each panel- even one panel fully shaded won’t bring down the whole string.
- The Grid-Tie Inverter then performs the AC conversion.
- Allows for different modules, orientations, and tilts on the same string.
- Includes online monitoring - down to the panel
- Produced in California

Dashboard

monitoring.solaredge.com/solaredge-web/p/main

## Overview

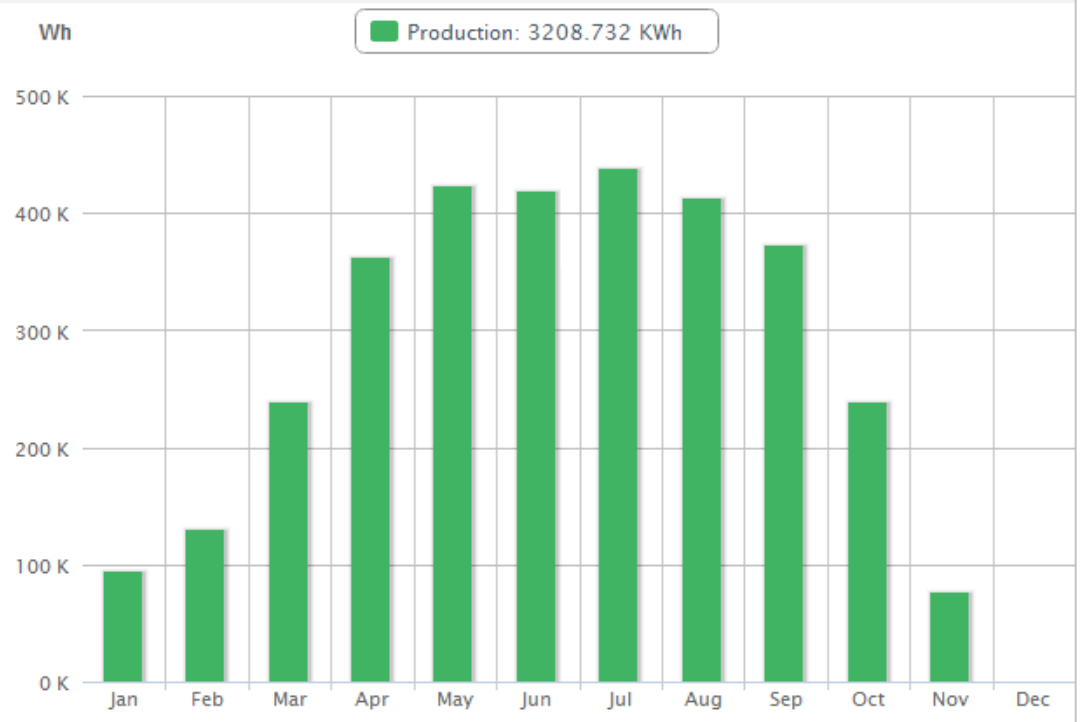
| Current Power | Energy today | Energy this month | Life time energy | Life time revenue |
|---|---|---|---|---|
| 11.39 W | 979.2 Wh | 76.97 kWh | 3.21 MWh | $224.61 |

solaredge

## Power and Energy

Week | Month | **Year**

**01/01/13 - 12/31/13**




2013

Previous year | Next year

## Site summary

**Site status:**

| | |
|---|---|
| Name: | BTPV |
| Address: | Elm Street 4237 |
| Country: | United States |
| Installed: | 01/11/2013 |
| Last updated: | 11/17/2013 15:27 |
| Peak power: | 3.3 kWp |

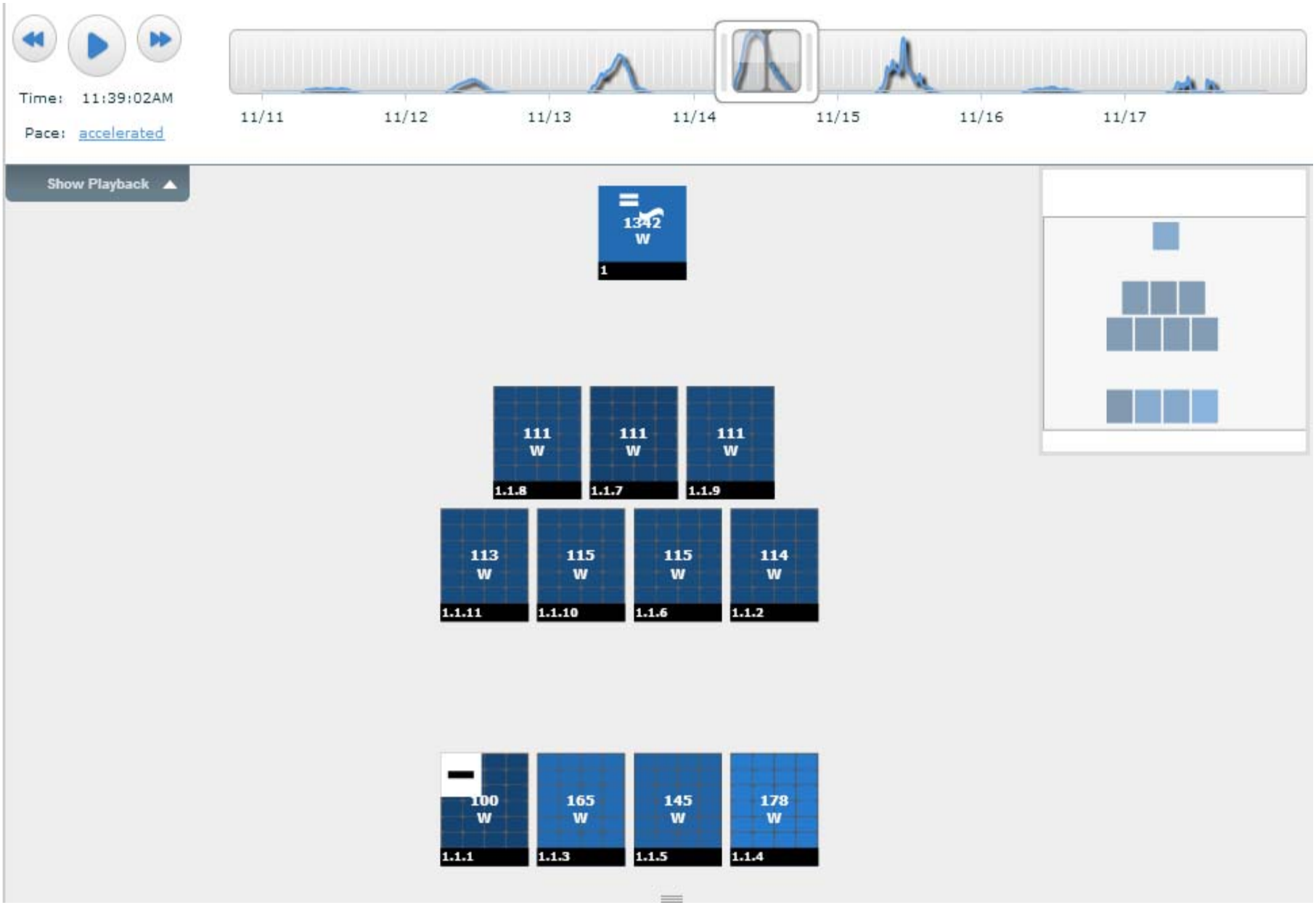
## Weather

Temperature 53.05 °F
Thunderstorms
Feels like 53.6 °F
Wind W, 16.15 MPH
Humidity 92.0 %
Sunrise at 06:44
Sunset at 16:29

| Sunday | Monday | Tuesday |
|---|---|---|
| 68-35.6 °F | 42.8-26.6 °F | 48.2-33.79 °F |
| Thunderstorms | Mostly Sunny | Mostly Sunny |

## Environmental Benefits

CO2 Emission Saved:


Time: 11:39:02AM
Pace: accelerated
11/11
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11/13
11/14
11/15
11/16
11/17
Show Playback
1342 W
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111 W
1.1.8
111 W
1.1.7
111 W
1.1.9
113 W
1.1.11
115 W
1.1.10
115 W
1.1.6
114 W
1.1.2
100 W
1.1.1
165 W
1.1.3
145 W
1.1.5
178 W
1.1.4

# 5 kW inverter- minimal cost increase

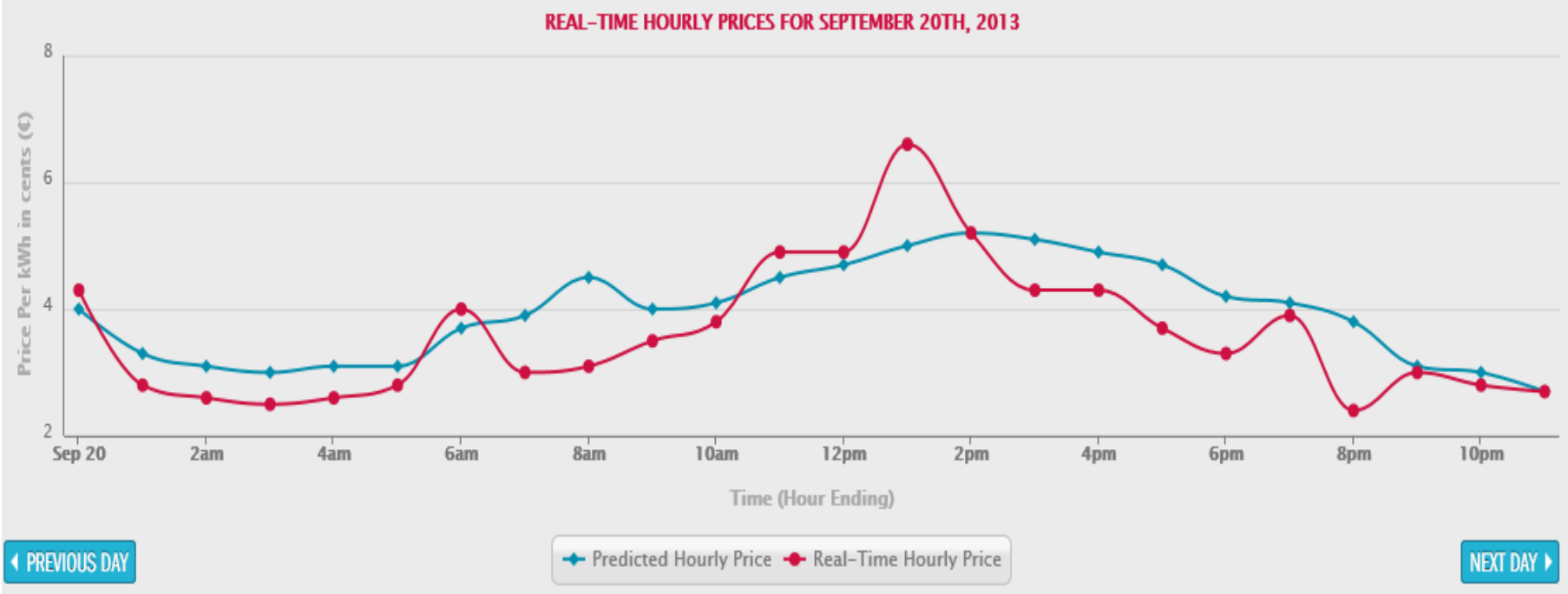
# American Panels – a dying breed

- Wanted to use Suniva panels (Georgia based, higher efficiency panels)- but they only sold in large lots.
- We went with Helios Solar Works panels, which are made in Milwaukee.
- Helios has just filed bankruptcy protection a couple months ago, due to Chinese PV producers dumping panels into the US market

# Birds eye view of 3.3 kW (11 panels)

# Solar Synergies

- Comed RRTP (Real Time Pricing)
- Electric Vehicles



# Lucille Carney - El Sierra School Principal

# Laura Kamedulski - El Sierra School Past PTA President

Downers Grove Grade School District 58

We Envision. We Seek. We Believe.

# El Sierra Solar Panel Production Tracking Website

https://enlighten.enphaseenergy.com/pv/public_systems/GMsr100747

Downers Grove Grade School District 58

We Envision. We Seek. We Believe.

# Ryder May
# Robert Bair Plumbing

# Downers Grove Solar Panel Educational Workshop


**Mark Handy**

**KenJiva Energy Systems, LLC**


**November 18, 2013**

# Solar Workshop Agenda

- Intro to KenJiva Energy Systems
- Installer as “Trusted Advisor”
- Process and timeframes in residential Solar projects
- Funding options
- What’s on the horizon

# Who We Are

- Founded September 2008
- Energy Systems and Services Company
- LEED AP Consultants
- NABCEP Certified Solar System Integrators
- RESNET / HERS Certified Energy Raters (Residential)
- BPI Certified Building Analyst and Envelope Professionals
- Member Company: Illinois Solar Energy Association
- Participant Organization:  Illinois Smart Grid Initiative
- Founding Partner: Chicagoland Green Collar Jobs Initiative

# Our Solar Team

- Mark Handy, Project Lead
  - LEED AP (Existing Buildings / O&M)
  - NABCEP Cert. of Knowledge- PV
  - Past BoD Secretary, ISEA – 2010-2012
  - Certified Energy Auditor and Building Analyst

- Trang Donovan, Lead Installer
  - Master Electrician
  - NABCEP Certified PV Installer
  - PV Instructor Midwest Renewable Energy Association (MREA)
  - 100+ Installs (PV)

# Our Solar Team

- John Price, Lead Installer-Thermal
  - > 35 year Veteran in Building Construction
  - > NABCEP Certified Solar Heating Installer
  - > Solar Thermal Instructor MREA
  - > Milwaukee Metro Solar Hot Water Council
  - > 50+ Installs (Solar Thermal & PV)

- Alex Kelly, Site Assessor/Installer
  - > LEED AP
  - > MREA certified Solar Site Assessor
  - > NABCEP Cert. of Knowledge PV/Thermal
  - > 50+ Installs (Solar Thermal & PV)

# What We Do: Energy Consulting

- Renewable Energy Project Management
  - > Siting / Permitting / Financing / Installation
  - > Urban Solar (Photovoltaic / Domestic Hot Water)
- Energy Audits, Measurement & Verification
  - > ASHRAE Level I, II and III (investment grade)
  - > Blower Door and Duct Leakage Testing
  - > Energy Star® Ratings
  - > LEED Energy and Atmosphere Credits

# Installer as Trusted Advisor

- Provide site assessments (refundable fee)- so you know what you have
- Source the best options for your site – not the most expensive
- Walk with you through the process – in person and in writing

# Processes and Timeframes

- Site Assessment –1 day on site, 1 week report turnaround
- System Proposal and Selection – 1-2 weeks
- Funding  (Loan Financing, Grant supplements, Milestone based payments, etc.)-Based on funding could be 3 months for Grants
- Engineering Inspection- 1 day on site, 1 week report turnaround
- Permitting-1 to 2 weeks
- Installation- Based on size.  Typical Residential- 3-4 days
- Commissioning & Final Inspection 1-4 weeks
- Grid Interconnection- 1to 2 weeks

# Payment / Funding Options

- Milestone based  for out of pocket payments
  - 60% at equipment delivery and permit
  - 20% at successful system commissioning
  - 20% at final inspection from Village
- Dept. of Commerce & Economic Opportunity Grants – Renewable Energy Rebate Program
- ISEA's Renewable Energy Credit Aggregation Program (RECAP)
- 30% Federal Renewable Energy Tax Credit
- 3rd Party Financing (We use Clean Power Finance)
- Illinois Clean Energy Community Foundation (ICECF)
- Solar Power Purchase Agreements ( Commercial )

# What's on the Horizon

- Continuation of the DCEO RERP grant (2015)
- Legislative fix of the RPS
- Community buying and Volume purchasing
- ISEA's Renewable Energy Credit Aggregation Program (RECAP)
- Continuation of  30% Federal Renewable Energy Tax Credit
- Solar Leasing (if RPS is Fixed)
- Arbitrage (IG)

KENJIVA

ENERGY SYSTEMS

# Questions?

# Thank you for attending!