



DISTRICT OF COLUMBIA SUSTAINABLE ENERGY UTILITY



Solar for Low Income Families DC Small-Scale Solar Initiative (DCSI)

George Nichols
DC Sustainable Energy Utility

What Is the Sustainable Energy Utility?

- Clean & Affordable Energy Act (2008)
- Ratepayer-funded, privately operated
- Performance-based contract to DDOE
- Designed to help District households, businesses, and institutions **save energy and money** through **energy efficiency** and **renewable energy** programs.

Why low-income solar in the District?

- Recent efforts focused on “motivated” participants
 - Local Community Solar Co-ops and DDOE
 - Renewable Energy Incentive Program (REIP)
- Previous efforts increased participation...but
- Significant differences in accessibility to renewables Wards 7 and 8
- Launched DC small scale low income solar initiative in spring 2012 (DCSI)

Clean Energy for ALL

- Wards 7 & 8 very underserved by renewable technologies
- DC SEU expanded opportunities for both solar PV for homeowners and jobs for residents
- 87 installations on low-income homes completed by Fall 2012



Program Overview

- To reduce burden of cost to participate in renewable energy technology in low income communities
- Initial installation goal = 20 systems
- Final installation = 87 systems
- Keys to Success
 - Education and Outreach
 - Leveraging Resources and Programs
 - Partnering with Trusted Leaders
 - Establish Process for Early Feedback

Financial Mechanisms

- 3 different approaches to financing projects by contractors ***with common elements***
 - All solar panels are owned by homeowners
 - SRECs are owned temporarily by installer or 3rd party financier
 - No out-of-pocket costs to homeowner

Results

- The program:
 - ❑ Demonstrated that implementation in low income communities was a reality
 - ❑ Demonstrated broad support
 - ❑ Tested local contracting capability
 - ❑ Identified tools of choice = education, marketing, trusted partners, supporting organizations, and financial incentives
 - ❑ Incorporated job training
 - ❑ Allowed for creativity
 - ❑ Sought to provide all residents an opportunity to enjoy benefits from new technology of renewal energy

Here Comes the Sun: Solar Market Potential and Technological Solutions

- What role should leasing and PPA strategies play in program policy?
- What are barriers to widespread adoption of solar PV/thermal in low income markets?
- What roles should DDOE and DCSEU play in strengthening the market for renewables?
- What would constitute an exciting vision for renewables in DC?

Role of Government

- Risk reduction is one of government's most important roles in promoting private investment in renewable technology.
 - resource evaluation and market evaluation;
 - providing access to expertise;
 - eliminating obstacles to markets; and
 - project oversight and evaluation.

What are the policy implications?

- Proactive Education and Outreach Activities
- Planning
- Technical Resource Support
- Permitting Process Improvements

Policy Drivers for Recommendations

- **Proactive Education and Outreach Activities**
 - Create a city-wide educational campaign and electronic resource to inform consumers about solar technology and its benefits;
 - In coordination with/and support of existing Community Solar organizations
 - Prepare collateral documentation and other materials
- **Planning**
 - Market Characterization
 - Roadmap Platform
 - Facilitate Solar Planning Across Agencies
 - Consider investing in innovation to create a scientific base which systematically feeds into a process for new technology applications

Policy Drivers for Recommendations

- **Technical Resource Center**
 - PV Solar Database Development and Management
 - Third Party Technical Review of Analysis and Recommendations
 - Early consultation on site selection
 - Maximization of energy efficiency opportunities
 - QA/QC
- **Permitting Process Improvements**
 - DCRA, Planning and Zoning Standards
 - Interconnection Processes

Vision for Renewables

- Renewable Energy Applications in District will be more diversified
 - Roof Top PV and Solar Thermal more abundant
 - Small-Scale Wind Power Turbines
 - Neighborhood scale renewable energy systems
- Renewables providing job opportunities
- Greater collaboration and cooperation on bulk procurement and clean energy generation opportunities
- Practical applications of a diversified renewables strategy achieving **50% of District's energy supply as envisioned in Sustainable DC**

Thank You!

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The logo for DC Sustainable Energy Utility (DCSEU) is located in the bottom right corner. It features the letters "DCSEU" in a bold, sans-serif font. The "DC" is in black, and the "SEU" is in a light green color with a white outline. The logo is set against a black rectangular background.

Solar Water Heating: DC Market

Zach Axelrod – CEO
Skyline Innovations



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GUARANTEED SAVINGS THROUGH GREEN ENERGY

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About Skyline Innovations

- Skyline makes saving money on energy easy for small- to medium-sized businesses
- Rather than changing customer behavior, deliver savings through technology and by reducing customers' energy prices
- Our innovation is a guaranteed savings model backed by patent-pending software

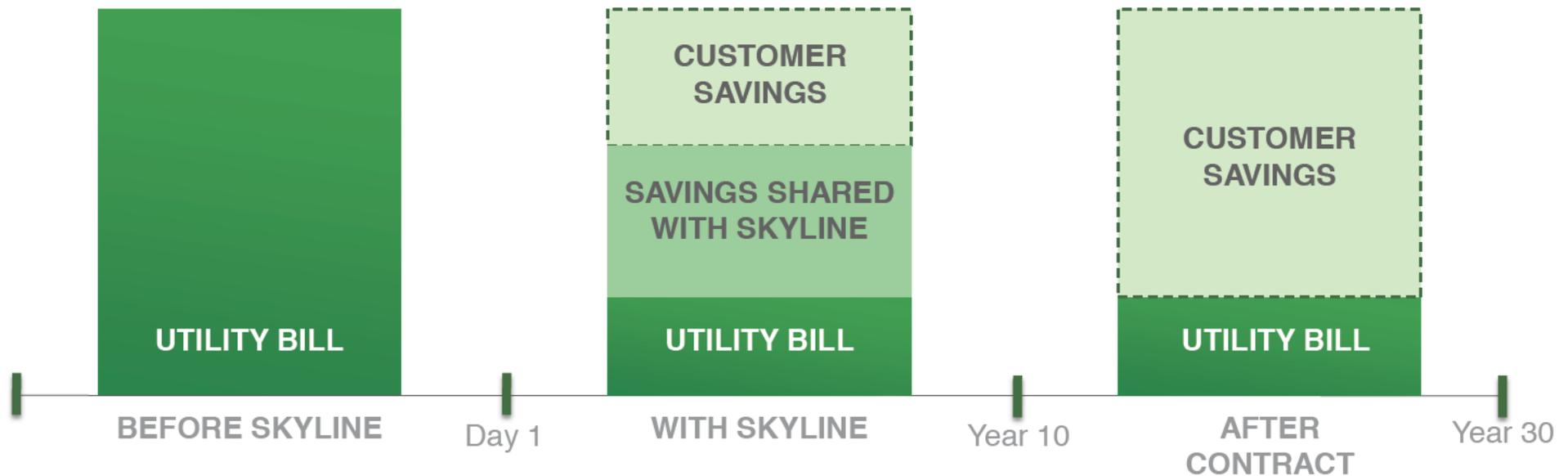


Skyline History

- August 2009: Solar water heating guaranteed savings in DC
- 2010: Project process automation and billing software; expand to MD
- 2011: Industry-leading \$30M tax equity project fund
- 2012: Enter CA with LACI partnership; largest developer/operator of commercial SWH in US
- 2013: Expansion to Hawaii, Puerto Rico

To date, Skyline has completed 118 projects and offset over 6,400 MWH

Guaranteed Savings Model: Technology + Price



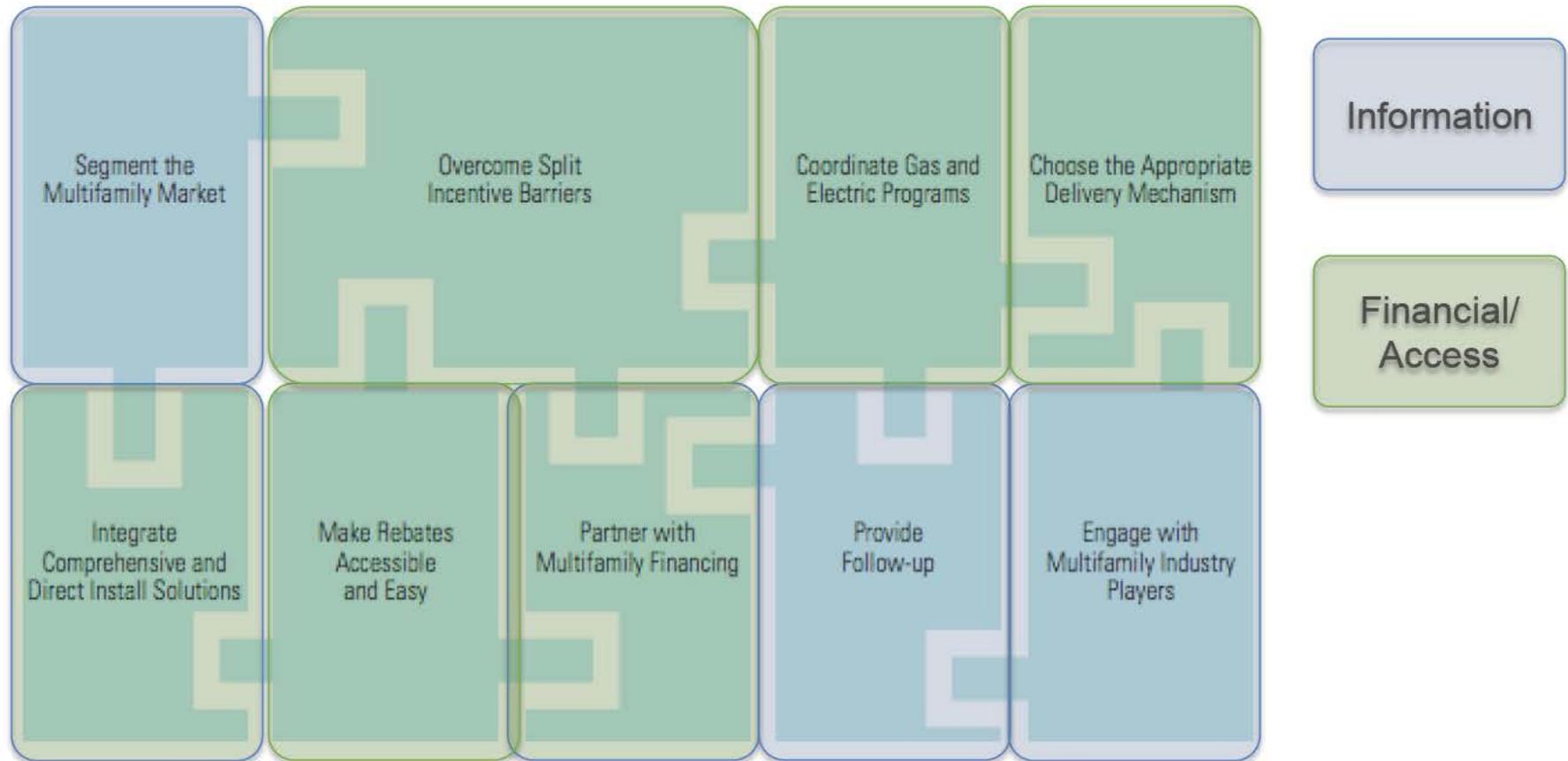
- Skyline as a “utility” sells price indexed energy
- Guaranteed savings model backed by proprietary, patent-pending software
- No customer capital investment; turnkey program with monitoring and M&V
- Savings are measured, not baselined + projected

DC Market

- Renewable Portfolio Standard enacted in 2005
 - Standard: 20% by 2020
 - Solar: 2.5% by 2023
- Solar Renewable Energy Credits (SRECs)
- Renewable Energy Incentive Program (REIP)
- Renewable Investment Tax Credit (RITC)
- Local Incentives / Programs
- Accelerated Depreciation

Multifamily Needs Remain Unmet

RECOMMENDATIONS FOR CREATING ENERGY EFFICIENCY PROGRAMS THAT ATTRACT MULTIFAMILY BUILDING OWNERS

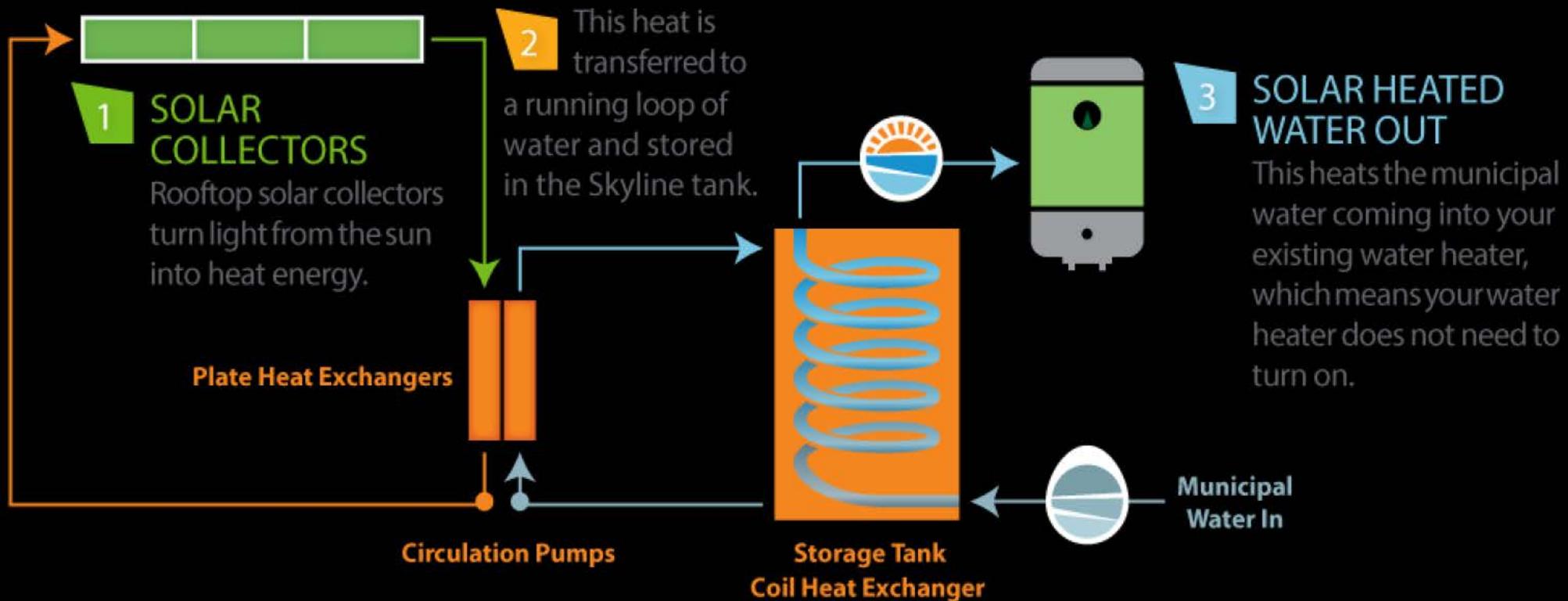


Engaging as Partners in Energy Efficiency: A Primer for Utilities on the Energy Efficiency Needs of Multifamily Buildings and Their Owners. ACEEE. March 2013.

4600 Connecticut Ave NW, Washington D.C.

Questions?



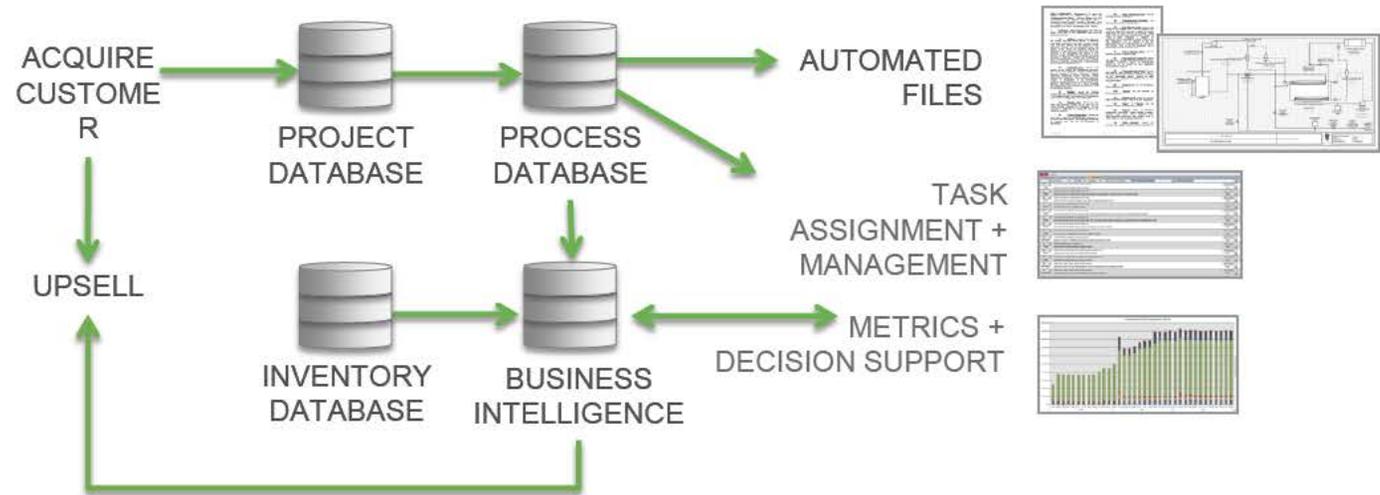


How We Do It: Product, Process, Technology

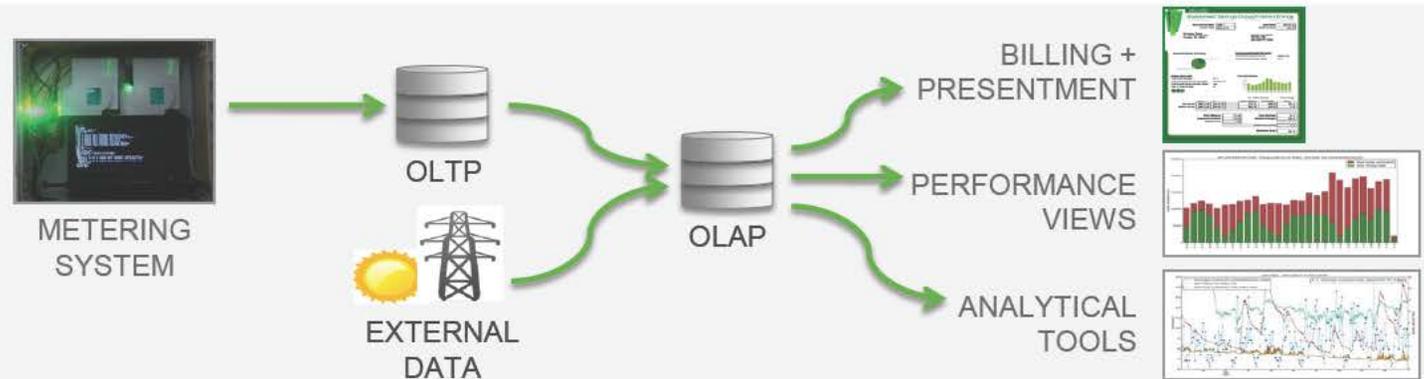
Skyline Model



Continuous Optimization + Automation

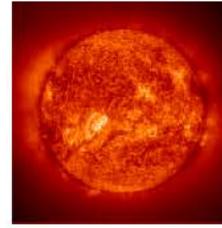


Extensive Monitoring + Analytics





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Here Comes the Sun: Photovoltaics

Photovoltaic market potential and
technological solutions

PV Frequently Asked Questions

- ▶ What will PV cost me?
- ▶ Why does it cost that much?
- ▶ What is happening to reduce that cost?
- ▶ How can I pay for it?
- ▶ What obstacles will I encounter?
- ▶ How can PV reach more people?
- ▶ What's to come for PV? In the District?



What will PV cost me?

- ▶ Two methods of presenting cost
 - Cost per Watt (\$/W) and % Offset
 - Based on nameplate DC rating
 - Cost per kWh (¢/kWh)
 - Incorporates design, site conditions, etc
- ▶ Price Tag vs Post-Incentive Cost
- ▶ Supplemental Costs
 - Building upgrades
 - Solar access – vegetation control – trees
- ▶ Residential – \$3.25–4.50/W
- ▶ Commercial – \$2.75–4.00/W



What will PV cost me?

▶ \$/Watt and % Offset

- Nameplate DC rating,
 - 10kW = 10,000W
- Annual energy (kWh) generation
 - 12,000 kWh (1.2x Watts)
- Compare to 12 month kWh usage
 - 16,000 kWh
- Cost = \$37,500
- \$/Watt = \$3.75
- % Offset = 75%

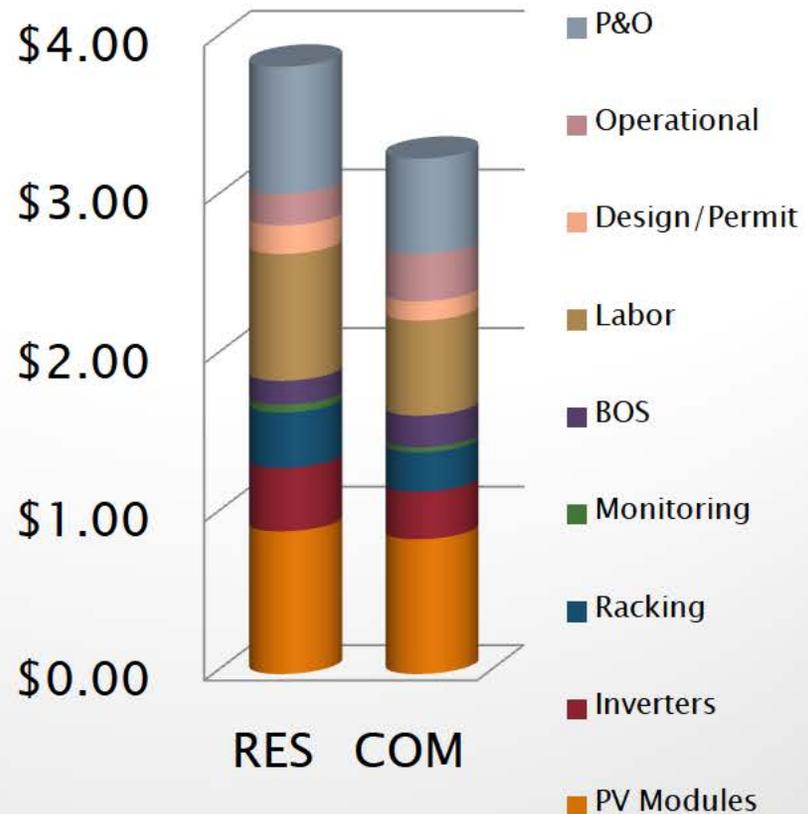
▶ \$/ kilowatt-hour

- Annual kWh generation
 - 12,000 kWh
- System lifespan
 - 25 years (module warranty)
- Degradation
 - 0.8% per year
- Cost = \$37,500
- \$0.14/kWh = 14¢/kWh
- Compare to utility rate



Why does it cost that much?

- ▶ PV Modules
- ▶ Inverters
- ▶ Racking
- ▶ Monitoring
- ▶ BOS
- ▶ Labor
- ▶ Design/Permit
- ▶ Operational
- ▶ Profit & Overhead



What is happening to reduce cost?

- ▶ PV Modules
 - Mono-Si – Improvements in manufacturing, efficiency
 - Thin film – Thin frames, glass, etc. Need more area, racking, BOS
- ▶ Inverters
 - Transformerless, ungrounded – Lower weight, higher efficiency
- ▶ Racking
 - Ease of installation, speed.
 - Race to the fewest components
 - Lightweight ballast trays, large span rails.
 - Roofing integration.
- ▶ Monitoring
 - \$1–3k for revenue grade. Required for certain sizes



What is happening to reduce cost?

- ▶ BOS
 - 1,000V systems increase circuit sizes, fewer circuits, less wire/conduit, etc
- ▶ Labor
 - Efficiency. Solar experience. Quality designs to eliminate work stoppage and field changes
- ▶ Design/Permit
 - Kitted/pre-designed systems
 - Efficient permit process. OTC review of simple projects, clear requirements published, eliminate unnecessary obstacles, online permitting, establish appropriate permit fees, FREE?
- ▶ Operational
 - Efficient scheduling, equipment rentals, safety planning
- ▶ Profit & Overhead
 - Simplify project processes. Administrative positions for incentive, permit, interconnection paperwork.
 - Cost of sales – lead acquisition, referrals, Angie's List, social



How can I pay for it?

- ▶ Cash Purchase
- ▶ Loans
 - PACE – Property Assessed Clean Energy – loan is attached to the property rather than an individual, paid back long term as part of property taxes
- ▶ Lease
 - Little/no upfront cost
 - Rent equipment and reap the benefits
- ▶ Power Purchase Agreement (PPA)
 - No upfront cost.
 - 3rd party owns system on customer's property and sells power at fixed rate
 - 2nd utility company
- ▶ Community Ownership / Virtual Net-Metering



How can I pay for it?

- ▶ **Federal Tax Credit**
 - 30% of system cost thru 2016
- ▶ **Corporate Depreciation**
 - Accelerated & Bonus Depreciation thru 2013
 - Typically amounts to 25–30% of system costs over 5 yrs
- ▶ **Renewable Energy Incentive Program (REIP)**
 - \$0.50/W, up to \$10,000
- ▶ **Solar Renewable Energy Credits (SRECs)**
 - Alternate Compliance Payment = \$500/MWh thru 2016
 - Brokering will pay less than \$500 depending on market
 - Options can amount to \$0.80–1.20/W
- ▶ **Personal Property Tax Exemption**
- ▶ **Net Metering**



What obstacles will I encounter?

▶ Roof condition

- PV will last minimum 25 years. Will the roof?
- Replacement/remediation costs expected
- New roof? Warranty maintenance requirements. Manufacturer limit roof penetrations/weight

▶ Building framing

- Addition of 3–10 lbs/sq.ft. and wind uplift forces
- Will the roof hold? Are upgrades necessary?
- Structural engineering analysis

▶ Electrical system

- Is it compatible for a code compliant PV interconnection?
- Service voltage and amperage configurations may limit size/type of PV system



How can PV reach more people?

- ▶ PV may not work because...
 - Financing
 - Shading
 - Vegetation
 - Adjacent properties
 - Roof space
 - Roof condition
 - Building framing
 - Electrical system
- ▶ You may have options...
 - Sell SRECs upfront, PPA, lease
 - Remove/trim trees
 - Building upgrades
 - Community Solar



How can PV reach more people?

- ▶ Reaching Low-Income Neighborhoods
 - Education and awareness of property owners and financiers
 - What is PV? How does it work? How can I pay for it?
 - Solar is not a luxury item (pool)
 - Solar is a building system (AC, furnace, etc)
 - Local financial institutions support
 - Hesitant to lend, but if they can pay PEPCO bill on time, they can make loan payment on time
 - Deferred maintenance – fixing and old, leaky roof may not be highest priority
 - Community solar / virtual net metering



How can PV reach more people?

- ▶ **Community Solar and Virtual Net Metering**
 - Single PV system installed within District
 - Large commercial/government/non-profit property owner offers/leases roof space for installation
 - Take on roof integrity liability
 - District should incentivize this
 - Individuals purchase shares of system
 - Thru virtual net metering, energy generated is credited to individuals PEPCO accounts
 - Property owners that could not otherwise Go Solar will have the opportunity thru such a program
 - Overall system cost is reduced
 - (1) 100kW vs (20) 5kW project



What's to come for PV? In the District?

▶ Technology

- 1000V systems
- Transformerless, ungrounded inverters
- AC modules/microinverters. Enphase now has serious competition
- Modules – gradually improving efficiency
 - Don't get too excited about solar technological breakthroughs (nanocells, PV paints, PV clothing, etc)
- Green Roof Integrated PV (GRIPV) – Incorporate PV system into vegetative roof. Vegetation cools roof, PV operates more efficiently at lower temperature



What's to come for PV? In the District?

▶ Market

- Prices dropped significantly 2008–2012. Less volatile decline. Grid parity this decade? By 2016 ITC expiration and ACP decrease \$500 to \$350?

▶ Policy/Regulation

- Community Renewables Energy Act of 2013 – should pass this legislative session
 - Incorporates Virtual Net Metering into existing net metering requirements
- DCRA improvements in permit process. New requirements soon.



Average Installed Cost/Watt

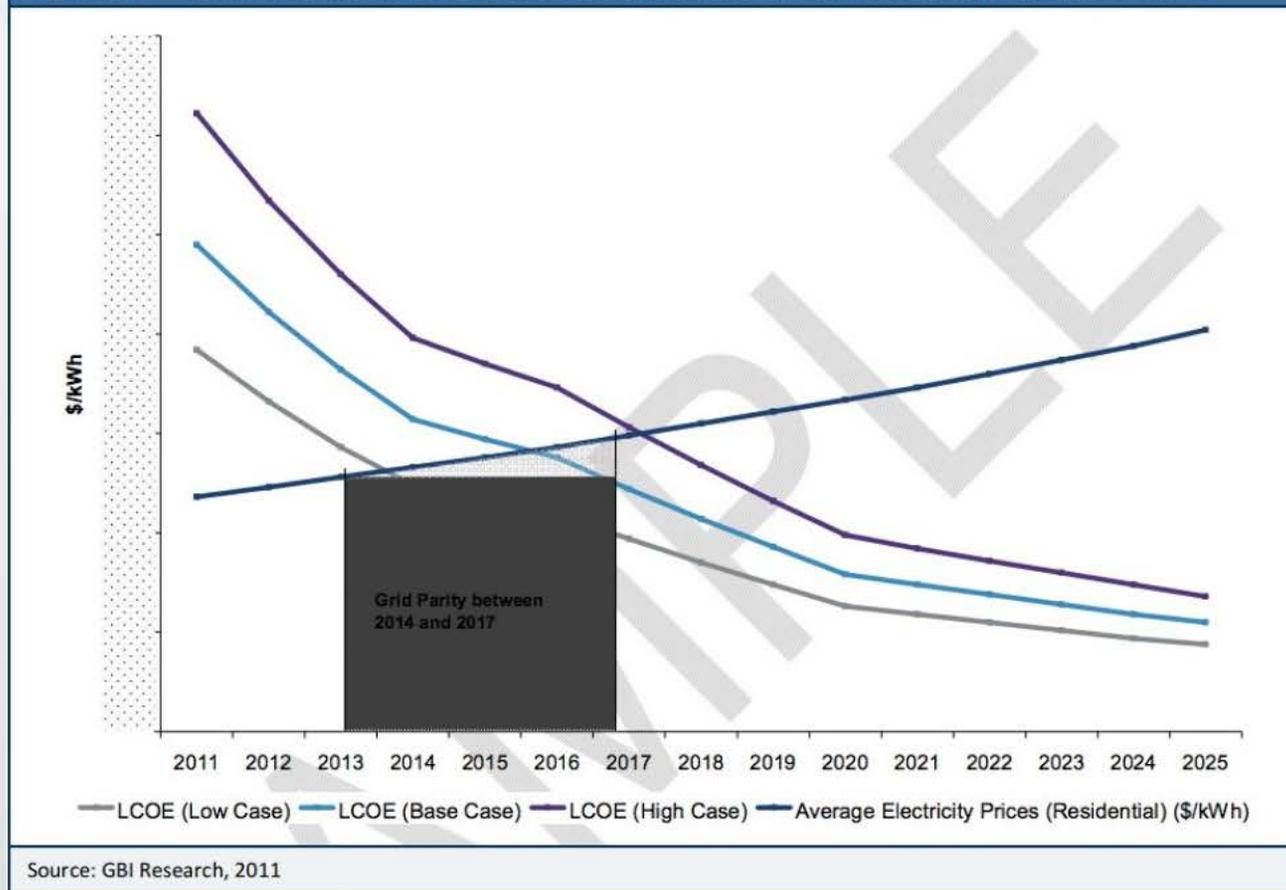
Blended Average System Price



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Solar PV Market and Grid Parity

Figure 97: Solar PV Market, The US, LCOE Comparison with Retail Electricity Prices, 2011-2025



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SRECs and the DC Market

- ▶ With an ACP at \$500, SRECs have traded in DC for as much as \$470 in June/July
- ▶ SRECs will NOT trade above ACP value, PEPCO will simply pay (less) for the compliance payment
- ▶ ACP of \$500 is through 2016. Now is ideal time to invest.
- ▶ The ACP will decline beginning in 2017, lowering SREC values.

Year	ACP per missed REC
Thru 2016	\$500
2017	\$350
2018	\$300
2019–2020	\$200
2021–2022	\$150
2023+	\$50



Questions?

- ▶ Kevin Graves
- ▶ Prospect Solar
- ▶ www.prospectsolar.com
- ▶ gravesk@prospectsolar.com



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