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 **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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Solar Water Heating: DC Market

Zach Axelrod – CEO
Skyline Innovations

GUA RANTEED SAVINGS THROUGH GREEN ENERGY
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

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- NO CAPITAL INVESTMENT
- GUARANTEED SAVINGS
- NO ONGOING EFFORT

customer value proposition
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
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

Questions?
1. **SOLAR COLLECTORS**
   Rooftop solar collectors turn light from the sun into heat energy.

2. This heat is transferred to a running loop of water and stored in the Skyline tank.

3. **SOLAR HEATED WATER OUT**
   This heats the municipal water coming into your existing water heater, which means your water heater does not need to turn on.
How We Do It: Product, Process, Technology

Skyline Model

Continuous Optimization + Automation

Extensive Monitoring + Analytics

Acquire Customer → Project Database → Process Database → Automated Files → Task Assignment + Management → Metrics + Decision Support

Upsell → Inventory Database → Business Intelligence

Metering System → OLTP

External Data → OLAP

Billing + Presentation → Performance Views → Analytical Tools
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,
  - 10 kW = 10,000 W
- 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 financers
    - 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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<th>Year</th>
<th>Installed Price ($W)</th>
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<tr>
<td>1999</td>
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<td>2011</td>
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<tr>
<td>Q1-03 2012</td>
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LBNL "Tracking the Sun IV" SEIA/GTM Research

ProspectSolar
Solar PV Market and Grid Parity

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

Source: GBI Research, 2011
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.

<table>
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<th>Year</th>
<th>ACP per missed REC</th>
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<tr>
<td>Thru 2016</td>
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<tr>
<td>2017</td>
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<td>2021–2022</td>
<td>$150</td>
</tr>
<tr>
<td>2023+</td>
<td>$50</td>
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</tbody>
</table>
Questions?

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- Prospect Solar
- www.prospect solar.com
- gravesk@prospect solar.com
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