Solar Panels and the Smart Grid
In the Pepco Region

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Pepco is a regulated electric utility delivering electricity to more than 750,000 customers in Washington, D.C., and its Maryland suburbs.
Renewable Portfolio Standards

- RPS requires electricity suppliers (all utilities and competitive retail suppliers) to use renewable energy sources to generate a minimum portion of their retail sales.

32 States + DC with RPS’s (5 voluntary & 16 with Solar Provisions)

(www.eere.energy.gov)
Maryland RPS & EmPOWER

• Standard: 20% renewables by 2022: \( \approx 3,457 \) GWh
• Solar Carve-Out: 2% by 2022 \( \approx 346 \) GWh
• Enacted in May 2004 and revised in 2007 and 2008 EmPOWER Maryland Initiative:
  – Reduce energy consumption and electric demand 15% by 2015
District of Columbia RPS

- Standard: 20% renewables by 2020: \( \approx 2,638 \text{ GWh} \)
- Solar Carve-Out: 0.4% by 2020 \( \approx 53 \text{ GWh} \)
- Enacted in January 2005, applies to all retail electricity sales in the District. Amended in October 2008 by the Clean and Affordable Energy Act of 2008
Pepco’s Blueprint for the Future

• Comprehensive Plan to help meet RPS & Minimize Carbon Footprint
  – Demand Response
  – Conservation
  – Renewable Energy Programs
  – Energy Efficiency
  – Smart Grid initiatives
    • Advanced Metering Infrastructure

• Will help Pepco customers:
  – Conserve energy
  – Reduce peak electricity demand
  – Manage future energy costs
Net Metering

• Definition: The difference between energy supplied and energy consumed at the customer meter on a kWh basis

• The grid remains the constant back-up for the customer
Net Metering

Maryland
• Up to 2 MW system
• Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle

DC
• Up to 1 MW system
• Credited to customer's next bill at retail rate; carries over indefinitely

www.dsireusa.org
Solar Electricity – The Big Picture

• United States: For use in electricity generation in 2007, renewable energy accounted for 8% in which solar was just 0.2% of the 8% (www.eia.doe.gov)

• Pepco DC currently has 73 solar installations totaling 536 kW
  – Average 7.3 kW

• Pepco MD currently has 160 solar installations totaling 1.62 MW
  – Average of 10.1 kW
Solar Electricity – The Big Picture

• PV panels generate electricity from sun light and can interconnect with a utility's power grid
• One of the biggest drawbacks is the high capital costs and installation costs (Washington DC is expensive urban area and labor costs are high)
• The use of solar energy is expanding rapidly even though total contribution remains low
• On-going research improves efficiency
Solar Electricity – Benefits

• Environmental (offsets CO2 & curbs climate change – renewable resource)
• Improve grid reliability & energy security
• Provide new jobs in a growing industry
• Meets demand and capacity challenges
• Good alternative for satisfying peak electricity loads
• Gaining energy independence
• Supports RPS goals and Pepco’s Blueprint goals
• Lower electric bills
• Costs of solar panels going down because of the current economy & on-going research
Solar Electricity – RECs

• Renewable Energy Certificates (REC’s) represent attribute & benefit of green power

• 1 REC = 1MWh energy produced

• Can be sold and traded separately from the electricity

Solar RECs ≈ $330.00/MWh for MD
Solar Electricity – Current Incentives

• Federal:
  – Tax credit of up to 30%; no cap (Must be placed in service before Dec. 31, 2016) (www.IRS.gov)

• Maryland: Solar Energy Grant Program
  – $1.25/Watt for the first 2kW of capacity. $0.75/W for 2-8kW. $0.25/W for 8-20kW (Max of $10,000)
    (www.energy.maryland.gov)

• DC: Renewable Energy Incentive Program
  – $3/Watt for first 3 kW installed capacity. $2/W for each of the next 7 kW. $1/W for each of the next 10 kW (Max of $33,000)
    (www.green.dc.gov)

• Also check with your local county
Solar Electricity - Interconnection

• Green Power Connection™
  – Pepco makes the process of green power interconnection easy
  – Our Green Power Connection™ website provides useful information including:
    • Scenarios
    • Application Process
    • Incentives
    • Pepco Tariffs
    • Important links
  – www.pepco.com/energy/renewable/connection/
Solar Electricity – In DC

Solar Hours = # hours per day that there is 1 kW/m² (STC) of sunlight for a given area

DC & MD at 38.5 Latitude & has 4.7 solar hours avg.

Cold winters – improves efficiency

Building height restricted in DC
Solar Electricity – In Maryland

• **Example** in Maryland
  – 2 kW system
  – 4.7 average daily solar hours
  – 0.80 - De-rating factor of system – ie. Inverter
  – \( 2 \text{ kW} \times 4.7 \text{ hours/day} \times 0.8 \times 365 \)
    = \( 2745 \text{ kWh/year} \times 14\text{¢ kWh (residential)} \)
    = $384/year
  – Incentives can offer pay-back in half the time & selling RECs can often lower pay-back significantly
Solar Electricity – In DC

- Pepco’s substation in DC
- 48 panels
- 210 Watts each
- 10 kW total
The Link: Smart Grid ↔ Solar

As you have seen Solar and Smart Grid support many of the same benefits & plans at all levels.

When implemented together, there is a greater chance for customers to benefit and for states to reach their RPS goals.
Smart Grid – The Whole Story

• **Smart Grid**: One of the most profound technological evolutions of the electric grid
• And allows the grid to use new state-of-the-art innovations
• ‘Smart’ means the grid has two-way communications with home meter & utility
• Smart Grid requires a more sophisticated 2-way metering and data communications network known as Advanced Metering Infrastructure (AMI)
AMI smart meters collect and communicate transactional data at the point of delivery to the customer.

Thus, AMI is key to the deployment of the smart grid.
Smart Grid - Benefits

- **What are the Benefits:**
  - Supports new rate options
    - Pricing for renewable generators
    - Pricing for Plug-in Vehicles
    - Dynamic pricing
  - Distribution System Management
    - Outage reporting/Quick outage dispatch
    - System Monitoring/Performance/Reliability
    - Tamper Detection
  - Provides knowledge of what is happening on grid which allows better planning in order to optimize distribution system design
  - Integrating small scale renewable generators to function in a way that supports the grid
The Solar Decathlon

- Pepco has installed net meters for the solar homes in the Decathlon
- Net metering is most heavily weighted scoring category in the competition this year
- Demonstrates, in a village setting, how net metering can integrate solar energy into the energy mix
The Solar Decathlon
The Link: Smart Grid ↔ Solar

• Net Metering supports and encourages solar installations, becomes easier to implement because AMI smart meters can separately record flows of energy in each direction

• AMI enables the increased use of solar by making it easier to integrate them into the grid
The Link: Smart Grid ↔ Solar

- With AMI enabled dynamic pricing, customers with solar can lower energy costs by monitoring prices and choosing to use more of their solar resources during peak pricing.
- Customers with solar will not have to compromise by reducing electrical usage during peak pricing periods – they will be able to run A/C and other appliances during those periods without being affected by higher peak prices (or gain a greater rebate for peak rebate pricing).
Additional Information

- Pepco: [www.pepco.com](http://www.pepco.com)
- Department of Energy: [www.doe.gov](http://www.doe.gov)
- Energy Information administration: [www.eia.doe.gov](http://www.eia.doe.gov)
- Database of State Incentives for Renewables and Efficiency: [www.dsireusa.org](http://www.dsireusa.org)
- Maryland Energy Administration: [www.energy.state.md.us](http://www.energy.state.md.us)
- District Department of the Environment: [www.green.dc.gov](http://www.green.dc.gov)
- [www.IRS.gov](http://www.IRS.gov)
- [www.energystar.gov](http://www.energystar.gov)
Questions