Your Home, Your Yard: Steps You Can Take to Lower Your Carbon Footprint

Small steps you can take to help heal our plant

Speakers
Dr. Yousef Zarbalian: Chesapeake PSR
Dr. Sara Via: Chesapeake PSR
Charles Juris: Energy House
Ben Glenzer: Solar Solutions for All

The Common House
9701 Farmside Place
Vienna, VA 22182

RSVP to twhitehouse@psr.org

November 16, 2017 7:00pm to 9:00pm  *Snacks provided

Sponsors
Chesapeake PSR, 350Loudoun.org, 350Fairfax.org, Sierra Club Great Falls Group.
Introduction

Solar Solutions For All, LLC

a

Renewable Energy Solution Provider

Ben Glenzer

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Direct: 571.252.9717
Fossil Fuels are for Historians, Renewables for the Future!
Example: Essen, Germany

was named European Green Capital 2017
How Solar Lowers Your Carbon Foot Print in your Yard (steps)

- **N: Naysayers:** Overcome typical objections. Change is good! You are not the first being energy efficient
- **N:** No impact from our an energy efficient home on the environment? YES, you can make a difference
- **N: Nega Watt** (the energy not used and saved). Energy efficiency typically is the most cost-effective, most available clean energy resource
- **N: Net-zero** carbon foot print with PV solar
How Solar Lowers Your Carbon Footprint

Energy Produced

194 MWh
You could power the following for 1 day:

Carbon Offset

134 tons
You have offset the equivalent of:
Why Owning a Solar System

- Affordable: Lowest cost of ownership and LCOE besides wind power
- PV Solar increases home values (up to 7% in DMV)
- Maintenance free, proven technology works anywhere
- Integrates & upgrades well with other technologies (i.e. Geothermal, LED lighting, electric car charging)
- Climate Change Resilience preparedness (battery backup)
- Helping you neighbors with local clean energy from the sun
- Protection against inflation/rate increases (3.0% in VA)
Why Invest in Photovoltaic Solar?

- Beneficial to environment and quality of life
  Costs to human health from air pollution caused by fossil fuels averaged $188 billion the last decade

- Stewardship/Investing in the community and its future

- Need for clean local energy sources, jobs and growth

- Effective in any setting: Urban, rural, suburban, HOAs, small to large applications

- U.S. solar market grew by 8% in 2017, enough to power 9.1 million American homes.

- Solar power will cross a carbon threshold by 2018
What to Remember:

The Number 3 and Multiples:

- About $2.70 per Watt installed
- At least 36% reduction of the system price
- Payback time around 6 years
- Rate of return: about 9.9%
- Expected system life: minimum of 30 years
- The system of 9.9 kW replaces monthly 150 $
Why is Solar not more Popular in Virginia?

& the Myths about Solar

- Disruptive technology
- Decentralized, entitles the owner to manage their own energy. Loss for utilities
- System should not be replacing more than 100% electricity
- Until recently prices were high and payback times too short
- Not noticable (on the back, no noise)
- Myths: Appearance, HOA not supporting, maintenance, not enough sun hours in VA
Solar today in the US

- The cost of solar panels has dropped significantly over the past 6 years.
- 79% of Americans saying the country should put more emphasis on PV solar.
- What are companies doing?

- Apple owns biggest private solar power system in the US: The nation’s largest end user–owned, onsite solar photovoltaic array on land surrounding. The 100-acre, 20-megawatt facility located in NC produces 42 million kWh of renewable energy each year.
- Microsoft jumpstarts solar farm plan near Remington, VA: Partnership to built 20-megawatt generation plant powering 5,000 homes

- Amazon 80 MW Amazon Web Services PV solar farm in Accomack

- Applications for 64 solar farms across 40 jurisdictions, representing over 2,400 megawatts of clean energy

- Philadelphia Eagles: 100% of the Eagles operations are from renewables. Solar on their stadium, headquarters and training facilities.
Your Cost of Doing Nothing

$/kWh: Utility vs. System Levelized Energy Cost (LEC)

Utility Cost: $0.13 (inflated 3.50% per year)
Solar Electric (PV) LEC: $0.07
... no Cost of Doing Solar?
Environmental Benefits

Carbon Footprint

Your carbon footprint will be reduced. Over the life of your system 344 tons of carbon dioxide (CO₂) will be eliminated from your footprint. Equivalent to:

- Planting 8,015 trees.
- Driving reduced by 688,000 auto miles, or 35,088 gallons of gasoline.
- Recycling 1,087 tons of waste instead of sending it to landfill.
- 335,201 pounds (167.8 tons) of coal burned.
- and you will help avoid the use of up to 8,401,500 gallons of water by Thermoelectric Powerplants.
PV SOLAR - PV Modules as Wall Siding
PV SOLAR - PV Modules as Roof Replacements
PV SOLAR - PV Modules Vertically Installed
PV SOLAR - Solar Pavement
PV SOLAR - PV Modules as Movable Skylights
What to do next?

(continued)
Your Cost of Doing Solar...

<table>
<thead>
<tr>
<th></th>
<th>Cash Scenario</th>
<th>Loan Scenario</th>
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<tbody>
<tr>
<td>Contract Amount</td>
<td>$30,000</td>
<td>$30,000</td>
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<tr>
<td>Net-Cash at Install after <strong>9,000$ ITC</strong> (invested or received):</td>
<td>($21,000)</td>
<td>($0)</td>
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<tr>
<td>Incentives in Later Years:</td>
<td>$8,709</td>
<td>$8,709</td>
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<tr>
<td>Cash Gained Over System Life:</td>
<td>$60,454</td>
<td>$55,859</td>
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<tr>
<td>Return on Initial Cash Invested (IRR):</td>
<td>13.1%</td>
<td>11.5%</td>
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<tr>
<td>1st-Year Utility Savings Less Finance Payments:</td>
<td>$1,875</td>
<td>$15</td>
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</tbody>
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Terms of Finance Options:

Loan: "Fully-Amortized". $21,000 at 4.000% apr. Repaid: $155 monthly over 180 months. Interest tax deductible.
Why Choose Solar

Installed 100% Turnkey: $30,000 ($3.03 per watt DC)

Incentives available to Customer in 1st Year
Federal Tax Credit (30% of Gross Cost at Installation): ($9,000)
Net Cost at Install (after incentives): $21,000
Net Installed Price per Watt: $2.12 per watt DC

Total Incentives available to Customer in Later Years: $8,709
Present Value of Future Incentives: $5,781 (in today’s dollars)
* - Loudoun County Property Tax Exemption for Solar Equipment
* - SREC Program (out of state assumes ave. of $14 per MWh for 10 years)

Net-Present Cost: $15,219
... Let us be good stewards of the Earth we inherited. All of us have to share the Earth's fragile ecosystems and precious resources, and each of us has a role to play in preserving them. If we are to go on living together on this earth, we must all be responsible for it.

Kofi Annan
Solar today in Virginia

- Does it work in Virginia?
- Virginia’s solar power production is growing and it now ranks 29th in the nation in terms of straight solar power capacity.
US Electricity Cost Forecast

Price of Residential Electricity

Cents per Kilowatt Hour

<table>
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<th>Financial</th>
<th>PV Solar</th>
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<td>Periods (Years):</td>
<td>32.5</td>
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</table>

**Renewable Energy System Cost & Performance**

| Capital Cost ($/kW):      | $2,000.00 |
| Fixed O&M Cost ($/kW-yr): | $13.00    |
| Variable O&M Cost ($/kWh):| 0         |
| Heat Rate (Btu/kWh):      | 0         |
| Fuel Cost ($/MMBtu):      | 0         |

**Results**

| Levelized Cost of Utility Electricity (cents/kWh): | 12.5 |
| Simple Levelized Cost of Renewable Energy (cents/kWh): | **4.6** |
### Comparison across Categories

<table>
<thead>
<tr>
<th></th>
<th>PV Solar</th>
<th>Thermal Solar</th>
<th>LED Heat Rec.</th>
<th>Geothermal</th>
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<td><strong>Renewable Energy System Cost &amp; Performance</strong></td>
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<tr>
<td>Capital Cost ($/kW):</td>
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<td>Fixed O&amp;M Cost ($/kW-yr):</td>
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<td>Variable O&amp;M Cost ($/kWh):</td>
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<td>Fuel Cost ($/MMBtu):</td>
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<td>Levelized Cost of Utility Electricity (cents/kWh):</td>
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<tr>
<td>Simple Levelized Cost of Renewable Energy (cents/kWh):</td>
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<td><strong>7.4</strong></td>
<td><strong>4.3</strong></td>
<td><strong>6.2</strong></td>
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Closing Statement:

Energy Intelligence (EI): future proof your home, business and land now. Contemplate climate changes with violent changes in weather patterns, living off the grid for several days.

What is your cost of Doing Nothing?