SOLAR ECONOMICS

St. Paul's Solar Forum

April 27, 2025

viridiant

Viridiant is a non-profit organization advancing sustainable building practices through education, consultation, and certification across the Mid-Atlantic and Southeast. We help businesses, homeowners, and industry professionals design, build, and implement high-performance buildings and energy efficiency strategies.

Since its founding in 2006, Viridiant has facilitated the transformation of over 45,000 energy-efficient and healthy homes in the region.

www.viridiant.org

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Federal Incentive for Solar Arrays

30% of turnkey installation price

- Tax-paying entities: typical tax credit
- Non-tax-paying entities: "elective pay" payment from IRS

After 12/31/21 and before 1/1/33	30%
After 12/31/32 and before 1/1/34	26%
After 12/31/33 and before 1/1/35	22%
On or after 1/1/36	0%

*as of April 2025

https://seia.org/research-resources/25d-solar-tax-credit-what-homeowners-need-know/

Economics of solar in Richmond

- Net metering
- Dominion projecting significant rate increases
- Solar Renewable Energy Credits (SRECs): ~$40 (as of April 2025)
  - 1 SREC = 1 MWH of solar-generated electricity
  - A productive 10 KW solar array = ~12 MWH/yr.

Economics of solar in Richmond

Power Purchase Agreements: (PPAs):

- Developer installs solar on your site; you purchase solar energy at set rate
- Good for large arrays if up-front capital is unavailable
- Higher net cost, but may still be advantageous given other parameters

Clean energy journey – step by step

1. Lean on Experts

Start with an energy audit.

Virginia non-profits want to help! (SUN-VA, LEAP, HR Climate Hub, VAIPL, Viridiant)

2. Follow the Numbers

Focus on cost-effectiveness

Efficiency improvements often deliver best ROI

3. Think Long-Term

A 20-year simple payback = 5% ROI.

No need to do everything at once.

4. Invest in Quality

Durable, resilient building strategies save time/resources.

The installer is often more critical than the product.

Residential Tax Credits: Energy Efficiency

Energy Efficient Home Improvement Credit (25C)

- Existing homes only
- Full credit applies if home is not used more than 20% for business
- Credit amount paid for one tax year. Credit usable multiple years.
- AMT payer can claim

www.irs.gov/credits-deductions/energy-efficient-home-improvement-credit

25C Tax Credit: 30% - Up to Limits

30% credit for cost of qualifying improvements

Maximum Total Credit - Per Year	**$3,200**
Heat pumps and heat pump water heaters	$2,000
Total of all other improvements	$1,200
Maximum Annual Credit by Improvement Type	
30% credit covers labor & materials at primary or secondary residence	
Heat pumps (CEE highest tier excluding “advanced”)	$2,000
Heat pump water heater	$2,000
High Efficiency ACs & fossil fuel HVAC/DHW equipment	$600
Electrical panel (200 Amp, min.) & wiring	$600
30% credit covers labor & materials at primary residence only	
Energy Audit (must project energy & cost savings)	$150
30% credit covers materials only at primary residence only	
Doors (ENERGY STAR) ($250 per)	$500
Windows & Skylights (ENERGY STAR)	$600
Insulation to current IECC for climate zone	$1,200

Home Energy Savings: Top 10 Opportunities

Home energy saving tips:

Lower cost, DIY:

1. LEDs for everything
2. Insulate hot water pipes
3. Seal/insulate attic access doors
4. Stop drafts
5. Address duct leaks
6. Maintain HVAC equipment

Bigger jobs:

1. Insulation upgrades
2. Improve HVAC design and equipment
3. Replace very old appliances with high-performance models
4. Go solar if you have a good site
5. Replace single-pane windows with high-performance models

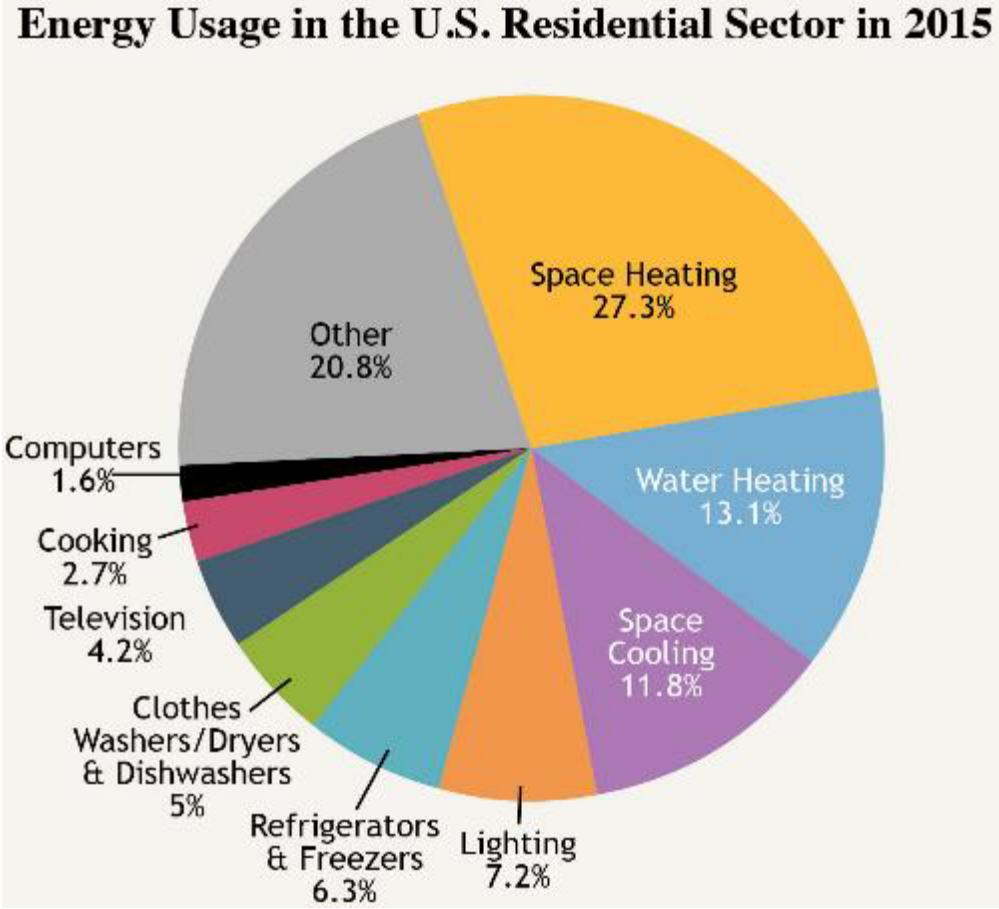

Image: National Academies of Science using EIA data needtoknow.nas.edu/energy/energy-use/home-work

#6 – HVAC Maintenance

HVAC Maintenance:

- Change air filters
- Clean equipment
- Maintain refrigerant charge
- Re-insulate line-set pipes

#5 – Seal Ductwork

Sealing duct work:

- Can be single most effective measure
- Very cheap as DIY
- Easy (sometimes)
- Saves energy *and* improves air quality

Heat Pump Water Heater Case Study

Water Heater Upgrade:

How to evaluate a solar proposal

1. **Per-Unit Cost:**
   Dollars per power production

   Divide turnkey price by the sum of the nameplate ratings of the array's panels.

   Examples:

   - $20,000 for 8000 W array (8KW) = $2.50/Watt (great!)
   - $20,000 for a 6000 W array (6KW) = $3.33/Watt (likely overpriced)
   - Current SUN-VA Co-op price: $2.25/Watt (amazing!)

How to evaluate a solar proposal

2. **System Productivity: Energy output / system size**

   Formula: KWH/yr / KW
   (annual energy output divided by rated power of array)

   - > 1.1 is good; > 1.3 is excellent

How to evaluate a solar proposal

Or…. how to get a good price on a productive solar array:

- **Installation Price:**
  - *Less than $3.00/W*
- **Good location:**
  - *KWH/yr per KW exceeds 1.15*

Unimportant: *% offset*

Grigsby Residence Solar Array

Stats since March 2017):

- 63,660 kWh generated
- $7,700 solar kWh value created
- Avg $80 value/month
- Financing cost: $56/mo. added to mortgage
  - Paid $2.50/W
  - Projected productivity: 1.36
  - Actual productivity: 1.29

Grigsby Residence Solar Array

- Real-time monitoring

Still have questions?

Lean on Experts

- Misconceptions abound!
- Start with an energy audit.
- Virginia non-profits want to help! (SUN-VA, LEAP, HR Climate Hub, VAIPL, Viridiant)

Thanks!
Questions?

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