Photovoltaics

Generating Your Own Power from the Sun

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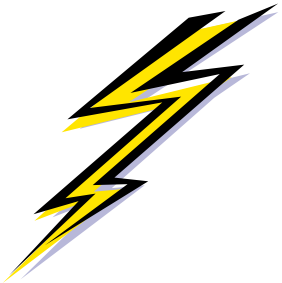
Question #1:

Isn't this what people put on their roofs in the 1970s?

or…

Will it heat my hot water and that's it?

Answer #1: No



- Photovoltaic (PV) Systems convert sunlight into electricity
- PV generated power can be used to power any electrical equipment in your home or office and reduce your electric bills
- 50 year old technology… now widely affordable
- PV systems have no moving parts
- PV solar modules are highly reliable…25 year warranties

Question #2:

Do we really get enough sunshine in the Hudson Valley for solar power to make sense?

Answer #2: Yes!

- Solar energy is measured in Peak Sun Hours per Day (kwh/m²/day)
- Los Angeles averages 5.6, Miami 5.2 … Hudson Valley averages 4.5
- Solar module output is higher in colder temperatures… + 5% in winter
- Photovoltaics are proven in the field:
  - dozens of systems are operating now in the Hudson Valley
  - customers are generating a fraction to over 100% of their own power
  - demonstrated year 1 returns of 6 to 10% on initial investment

Photovoltaic (PV) System

Solar Modules:

- South facing
- Tilted 45°, ideally
- Unshaded 9am to 3pm
- Pitched roofs, shingle or steel
- Flat roofs
- Ground mounted on poles
- Awning mounted on walls

Photovoltaic (PV) System

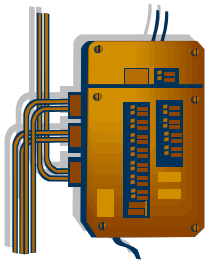
Energy Source

Solar Module Array

DC

Inverter

AC



Electric Service Panel

Energy Uses

Optional Battery Storage

Utility Grid

PV System Applications

Supplement & Reduce Utility Electricity

- partial reduction, peak load reduction, peak time load reduction
- completely offset utility electricity on an annual net metered basis

Back-up Power in the event of Grid Failure

- For selected critical loads

Off-Grid Applications

- For critical loads, to make an environmental statement, or to power remote buildings or applications

Net Metering

PV generation and purchases from the electric utility are "netted out" automatically … PV system can slow down the utility's meter or even ***spin it backwards***

Old: Residences with PV systems under 10 kilowatts can net meter (NY State Law)

New: Central Hudson will now permit all customers with under 15 kilowatts of PV to net meter (S.C.14 Standby Tariff, 7/04)

Financial Incentives

New York State is strongly supporting new PV Systems:

- Sales tax exempt as capital equipment (ST-124)
- Systems under 15 kw can qualify for NYSERDA rebates of $4,000 to $5,000 per kw (PON-716)
- Larger systems can qualify for similar NYSERDA support (PON-691)
- NYSERDA Energy Smart Loan fund can reduce borrowing costs by 400 basis points (4%)
- Systems under 10 kw on residences can qualify for an Income Tax Credit of about $1,500 per kw up to $3,750 (IT-255)

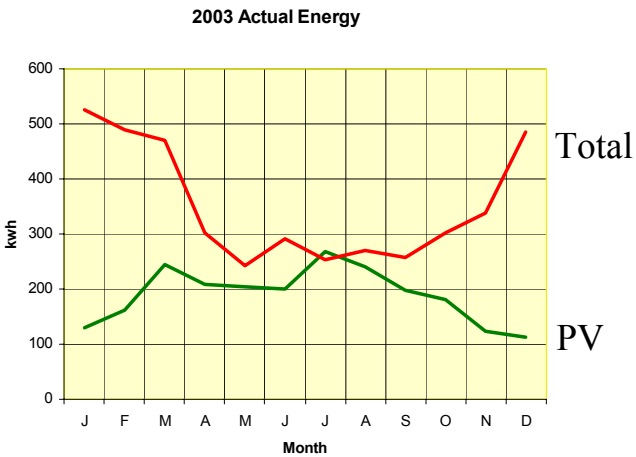
State rebates can total 60% of PV system total cost!

Case Study #1

2.0 kw PV System on Shed

PV Power Generation

Stable and Riding Arena



54% of total year's energy generated by PV system

Current System Price	$17,000
Current Rebates & Tax Credit	- 10,250
Net Customer Cost	$ 6,750
Year 1 ROI, actual	5.9%
Average ROI over module warranty	9.8%
Coal replaced	1.1 tons per year
Crude oil replaced	167 gallons per year
Greenhouse gas (CO_2) avoided	1.9 tons per year

Case Study #2

3.0 kw Ground Mount System
Residential, 3000 Square Feet, Family of 4

Current System Price	$25,500
Current Rebates & Tax Credit	- 15,375
Net Customer Cost	$10,125
First 6 months generation, actual	1,783 kwh
Annualized Year 1 ROI	6.0%
Average ROI over module warranty	10.0%
Coal replaced per year	1.8 tons
Crude oil replaced per year	324 gal
Greenhouse gas (CO_2) per year	2.9 tons
PV generation / total electric usage	36%
PV generation peak summer days	100%

Why Consider Solar Electric?

- Quiet, clean, zero emissions
- Robust, reliable, long life
- Scaleable and now affordable with generous incentives
- Actual on-site generation… use what you produce
- Reduce electric bills and provide a hedge against inflation
- Back-up power for critical loads and energy independence
- Distributed generation is less vulnerable to disruption or attack
- Stable ROIs of 6-10% for residential systems, higher for commercial