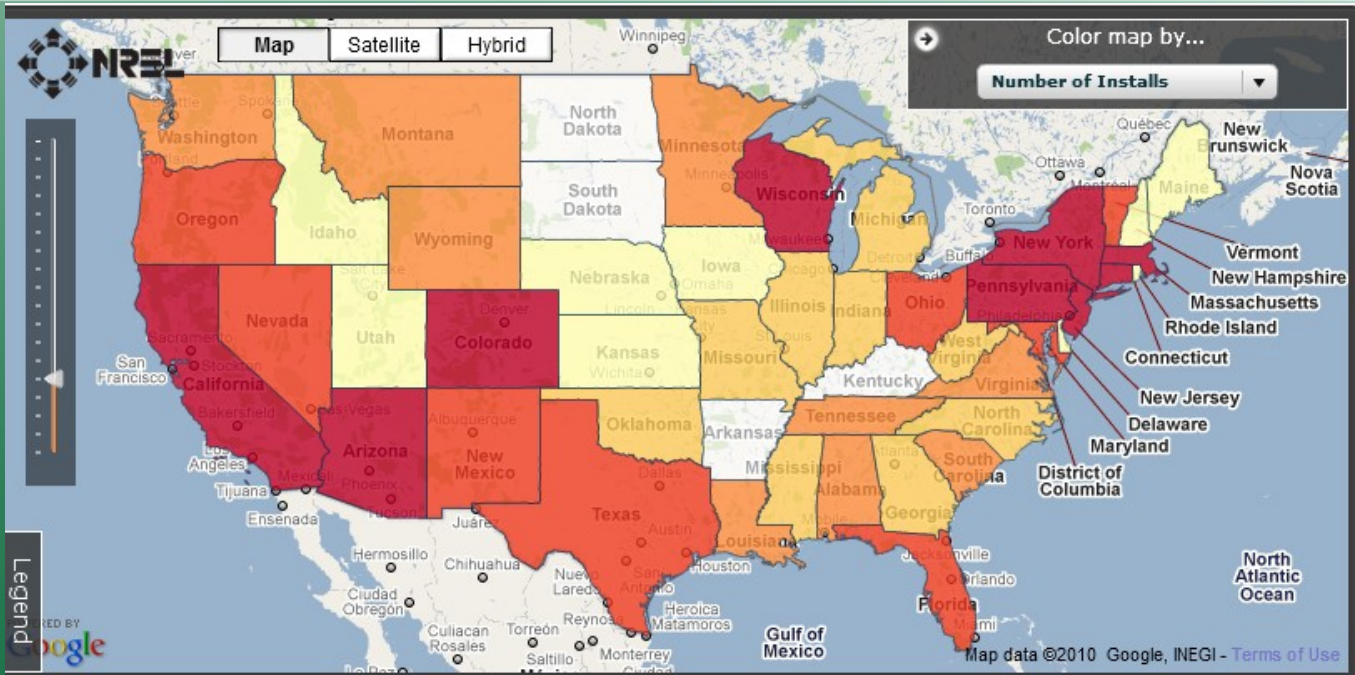


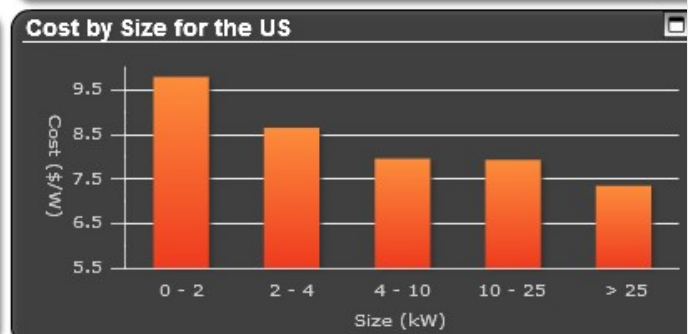
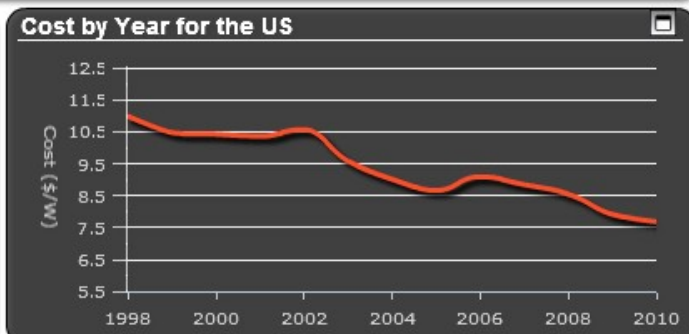
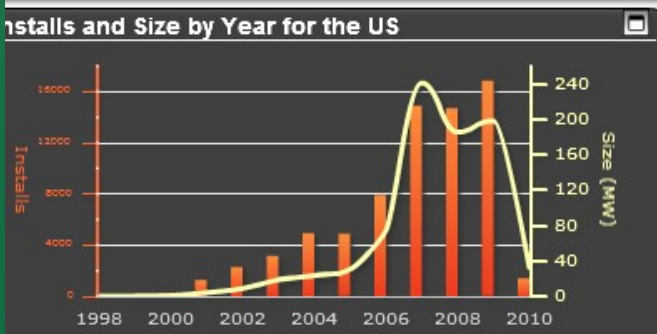
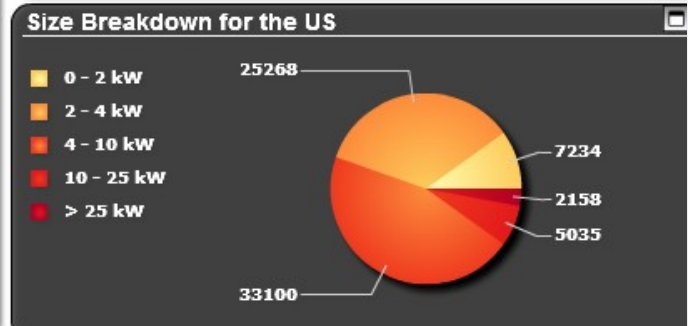


Open PV Project



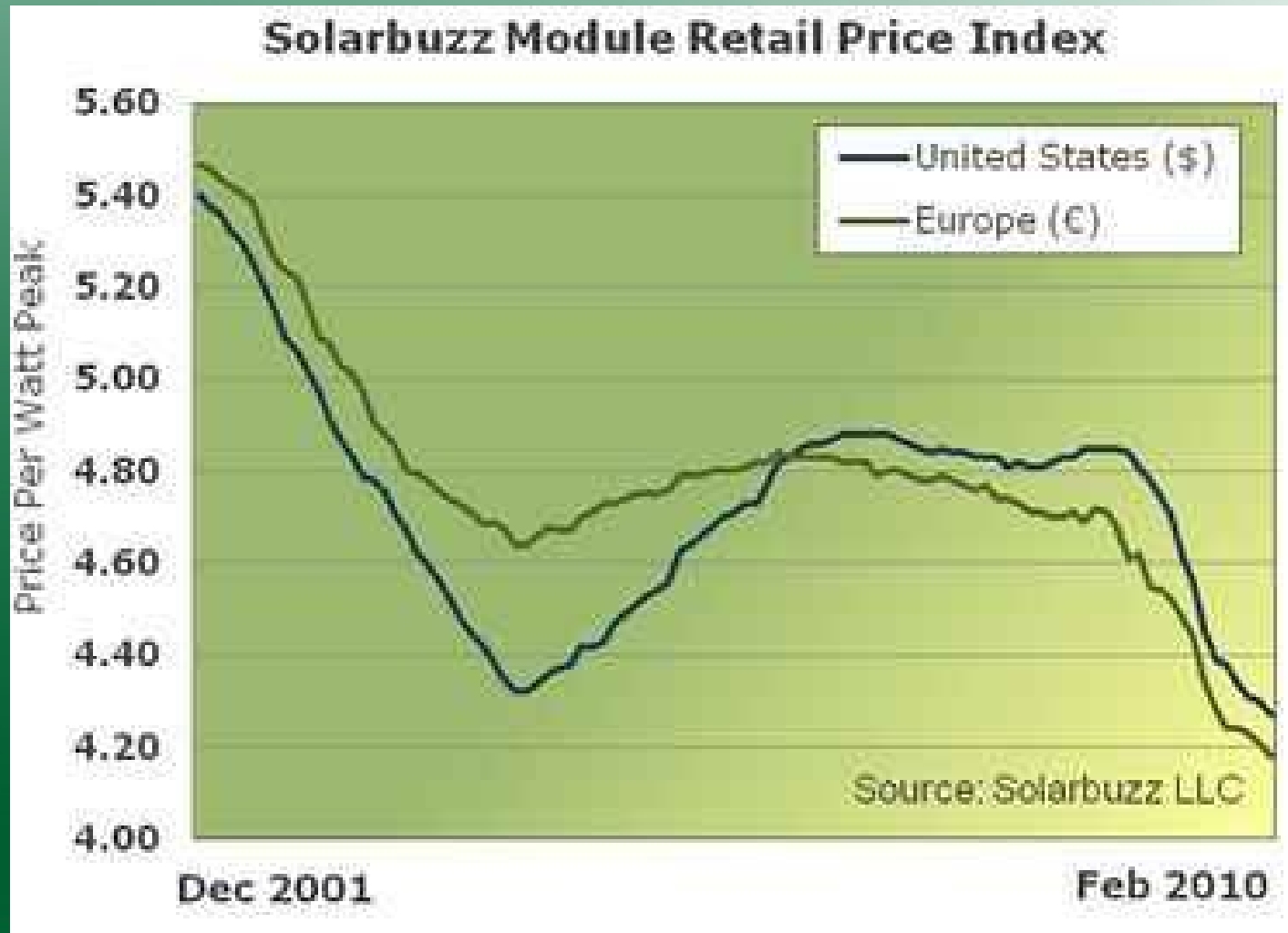
Statistics for the US

Total Number of Installs:	72800
State Rank:	
County Rank:	
Installed Capacity (MW):	819.23
State Rank:	
County Rank:	
Average Cost (\$/W):	8.71
State Rank:	
County Rank:	





Solar Buzz





Economic Analysis

Simple Payback = Initial Cost/Avoided Cost

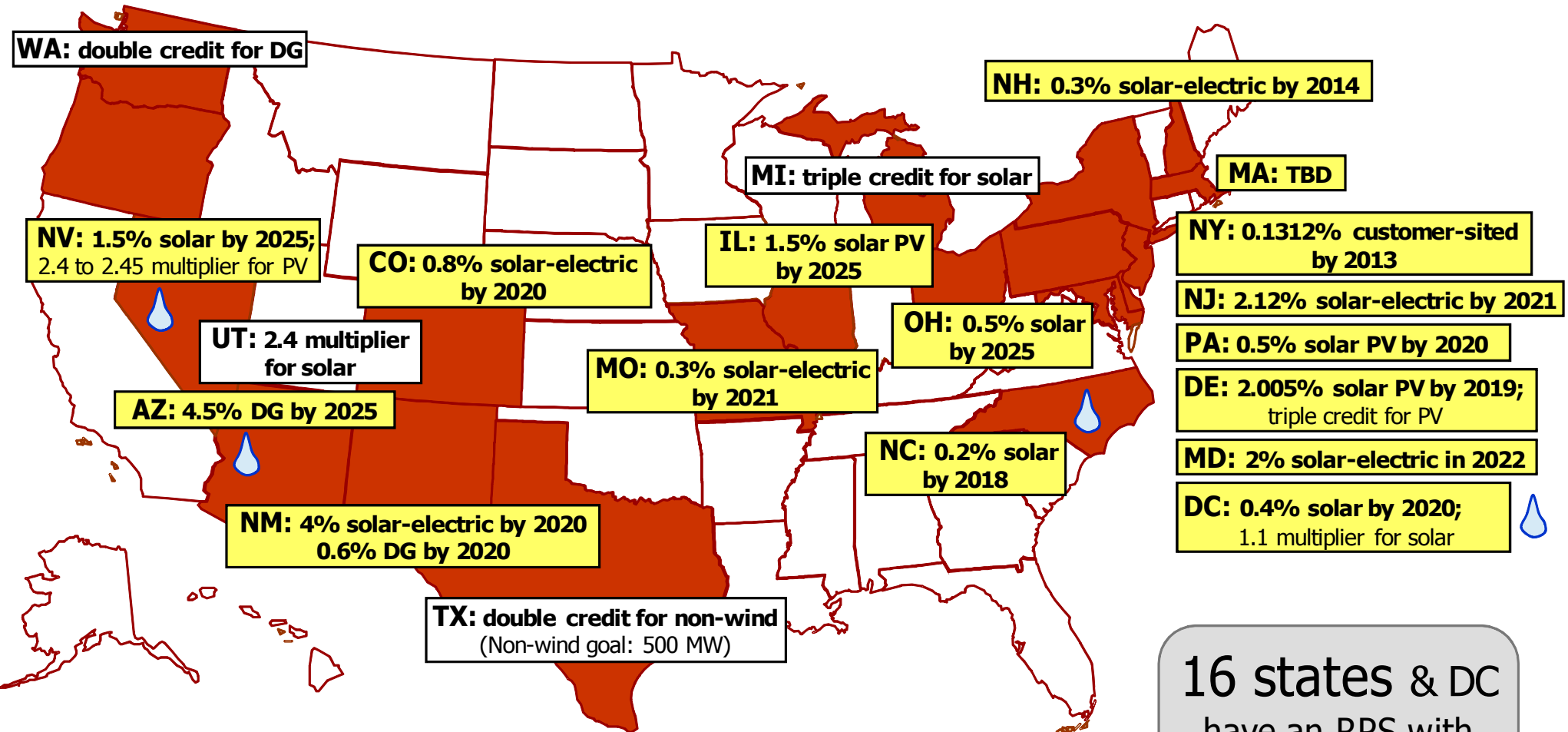
$$\$6,500/\text{kW} \div \sim \$117/\text{kW}/\text{yr} = \sim 55 \text{ years}$$

Based on \$0.08/kWh and 4.0 Avg. Peak Sun Hours/day

Return on Investment = 1/Simple Payback x 100%

$$1/55 \text{ yr} \times 100\% = 1.8\%$$

Need for incentives?



WA: double credit for DG

NH: 0.3% solar-electric by 2014

**NV: 1.5% solar by 2025;
2.4 to 2.45 multiplier for PV**

MI: triple credit for solar

MA: TBD

**CO: 0.8% solar-electric
by 2020**

**IL: 1.5% solar PV
by 2025**

**NY: 0.1312% customer-sited
by 2013**

**UT: 2.4 multiplier
for solar**

**OH: 0.5% solar
by 2025**

NJ: 2.12% solar-electric by 2021

AZ: 4.5% DG by 2025

**MO: 0.3% solar-electric
by 2021**

PA: 0.5% solar PV by 2020

**DE: 2.005% solar PV by 2019;
triple credit for PV**

**NM: 4% solar-electric by 2020
0.6% DG by 2020**


**NC: 0.2% solar
by 2018**


MD: 2% solar-electric in 2022


**DC: 0.4% solar by 2020;
1.1 multiplier for solar**

**TX: double credit for non-wind
(Non-wind goal: 500 MW)**

**16 states & DC
have an RPS with
solar/DG provisions**

 State renewable portfolio standard with solar / distributed generation (DG) provision

 State renewable portfolio goal with solar / distributed generation provision

 Solar water heating counts toward solar provision

Source: Dsire, September 2009

<http://www.dsireusa.org/>



Incentives for Solar in Missouri

Type	Federal	State	Local	Utilities	NGO
Rebates				Y	
Grants	Y	Y	Y	Y	Y
Loans	Y	Y			
Taxes	Y				
Net-metering	Y			Y	
REC's					Y



Incentives - Rebates

Source: Utilities

1. Columbia Water & Light - \$0.50/W
2. Investor Owned Utilities -
for example AmerenUE, KCP&L
\$2/W
mandated by Proposition C
effective Jan 2010



Incentives - Grants

- US Treasury Dept. - 30% of system cost
- in lieu of tax credits
- corporate, industrial, agricultural
- installed by 2010, closes 2011

USDA

- Renewable Energy for America (REAP)
- 25% of project cost
- commercial, schools, government, agricultural



Incentives - Loans

- MO DNR Energy Center has a revolving loan fund available to government institutions, schools, hospitals and water-treatment facilities
- Residential consumers: Missouri Linked Deposit
- allows lender to lower interest rate by 2-3%

<http://www.treasurer.mo.gov/AlternativeEnergy.asp>



Incentives - Taxes

- Federal Income Tax: 30% no cap; available until 2016; apply rebates first then deduction
- State Income Tax – not at this time
- Property Tax – P.A.C.E.?
- Sales Tax – not at this time



Effect of Incentives?

Rebate: $\$6,500/\text{kW} - \$2,000/\text{kW} = \$4,500/\text{kW}$

Fed. Tax Credit: $\$4,500/\text{kW} \times 70\% = \$3,150/\text{kW}$

Simple Payback = Initial Cost/Avoided Cost

$\$3,150/\text{kW} \div \sim \$117/\text{kW}/\text{yr} = \sim 27 \text{ years}$

Return on Investment = 1/Simple Payback x 100%

$1/27 \text{ yr} \times 100\% = \sim 3.7\%$



Net-Metering

- retail rate up to consumption
- overproduction credited at amount equal to at least the utility's **avoided fuel cost** not **marginal cost** of adding additional capacity nor does it account for cost of **peak power**
- Columbia Water & Light = \$0.10/kWh
- Boone Electric Cooperative \$0.03-\$0.05/kWh
- Credits zeroed annually without payment



Renewable Energy Certificates (REC's)

- similar to carbon credits; aka “green tags” or tradable renewable energy certificates
- facilitated by NGO's that collect a transaction fee and in Missouri under Prop. C. will reside with
- sold in units of 1000 kWh = 1 MWh
- in 2006 averaged \$20/MWh according to the DOE's Green Power Network
- this equates to about \$30/kW/yr; in many parts of the country it is much higher



What Economics Fails to Consider

Externalized Costs

- environmental impact
- quality of life: pollution, noise, aesthetics, ease of use, peace of mind

Energy Payback

Thin Film 240kWh/m²-1000kWh/m² Monocrystalline
(not including mining and refinement steps)

At 4.1 Peak Sun Hours 10% PCE Thin Film = 1.6 years
compared to 18% Monocrystalline at 3.7 years



Cost Analysis

Value of Money

Present Value

Future Value



Time



Cost Analysis

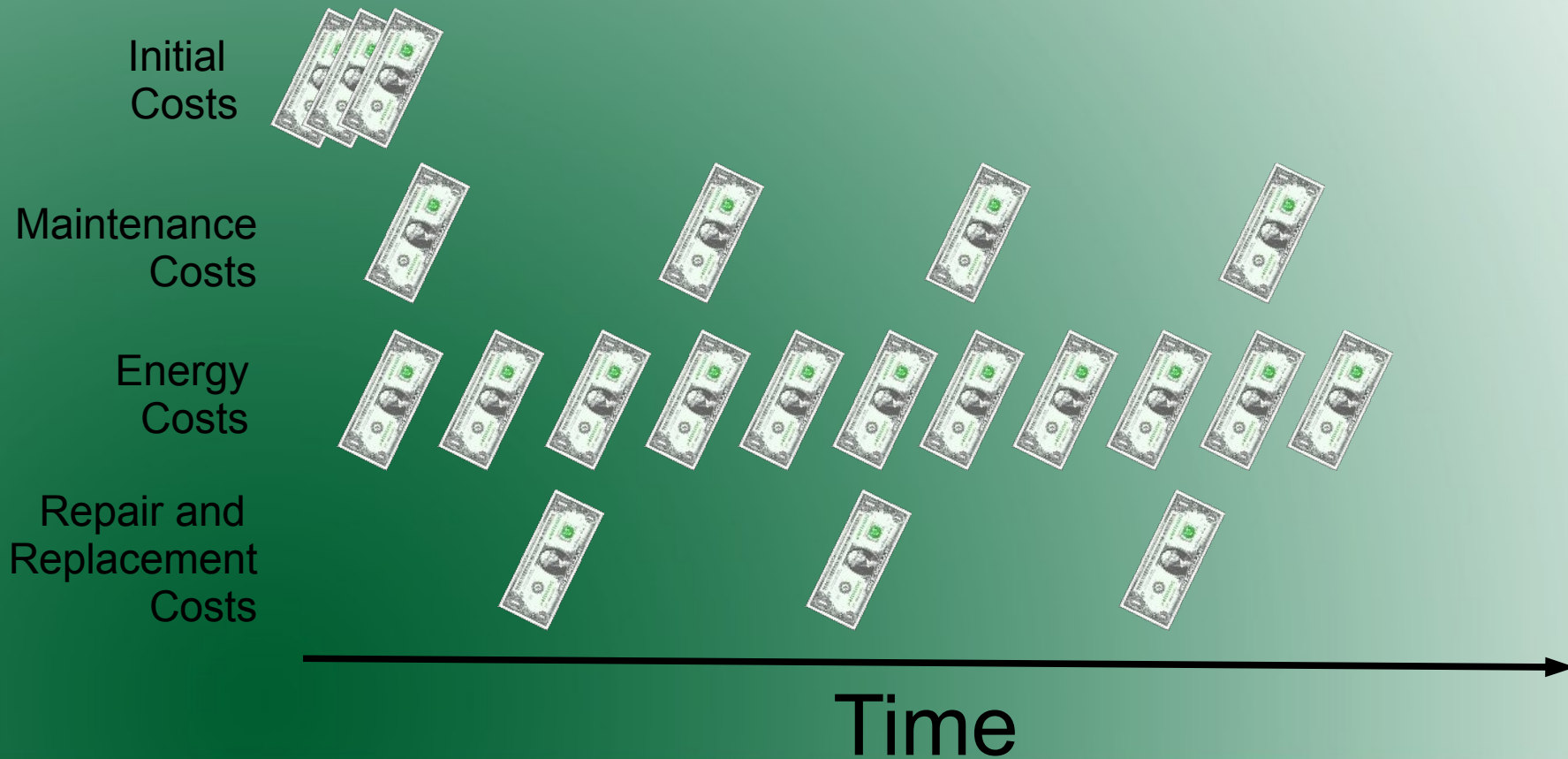
Discount Rates

- Combination of investment rate and inflation
- For example – Dow Jones Average for investment
Consumer Price Index for inflation
- Used to calculate **present value** of life cycle costs
- Tables of Single Present Value Factors, Recurring Present Value Factors and software are used



Cost Analysis

Life Cycle Costs





Cost Analysis

Life Cycle Cost Analysis

Initial Cost

+ Present Value of Maintenance Costs

+ Present Value of Fuel Costs

+ Present Value of Repair & Replacement Costs

- Present Value of Salvage Value

= Life Cycle Cost



Cost Analysis

Life Cycle Cost Analysis - Generator

Initial Cost	\$8,500
+ Maintenance Costs	\$2,718
+ Fuel Costs	\$31,918
+ Repair Costs	\$5,303
- Salvage Value	-\$684
<hr/>	
= Life Cycle Cost	\$47,555



Cost Analysis

Life Cycle Cost Analysis – Utility Connection

Initial Cost	\$25,500
+ Maintenance Costs	\$0
+ Energy Costs (7,800kWh/yr @ \$0.10/kWh)	\$11,606
+ Repair Costs	\$0
- Salvage Value	-\$0
<hr/>	
= Life Cycle Cost	\$36,606



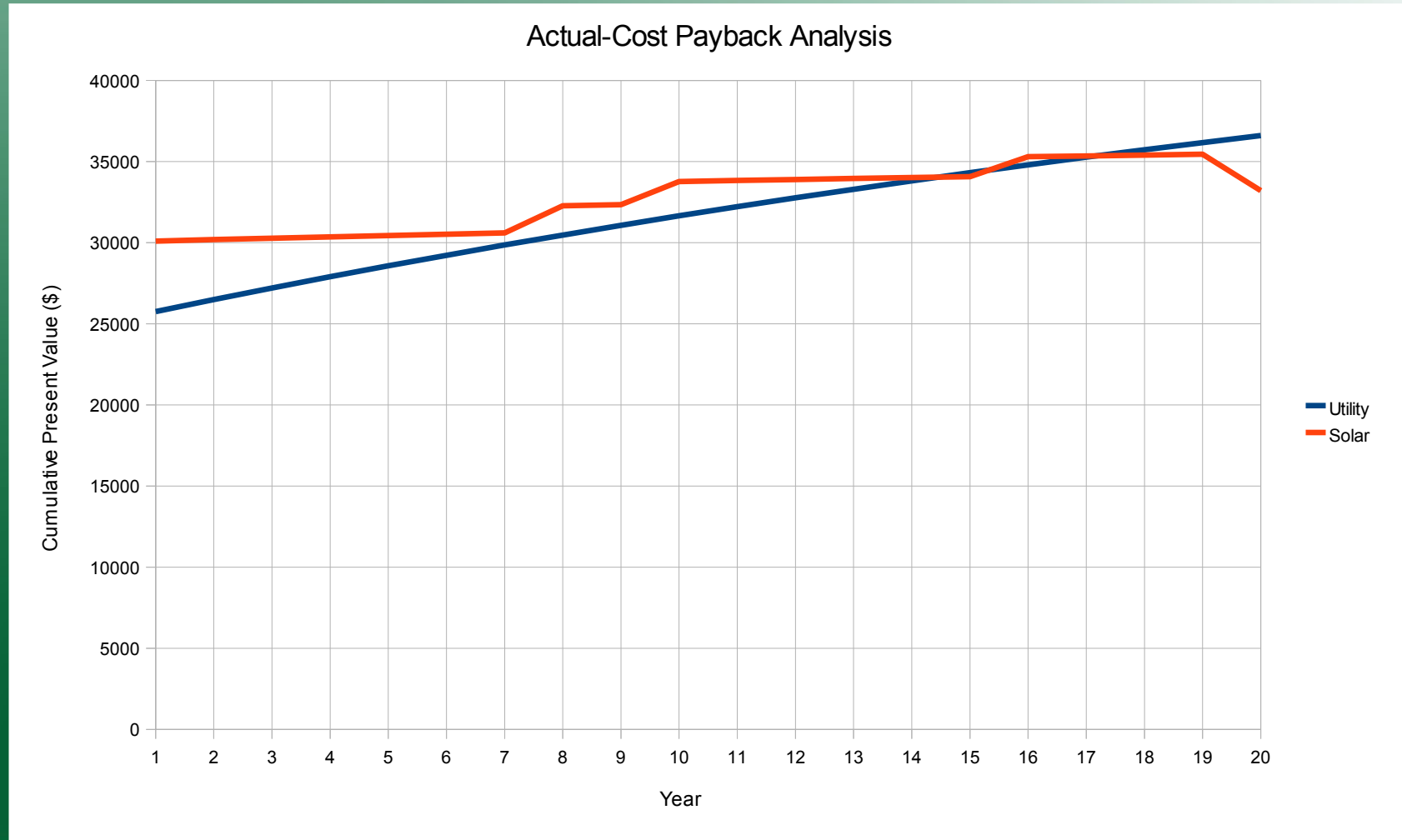
Cost Analysis

Life Cycle Cost Analysis – PV System

Initial Cost (5kW, 1000Ah)	\$30,000
+ Maintenance Costs	\$1,359
+ Energy Costs	\$0
+ Repair Costs	\$4,315
- Salvage Value	-\$2,280
<hr/>	
= Life Cycle Cost	\$33,214



Comparison of Two Strategies





Online Estimators



Helping You put Solar, Wind & Renewable Energy to Work

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2010 Calendar of Events

[Click Here for Details](#)

7 Jan - Mar 2 - Online Seminars

13 February - Santa Rita Eco-Market - San Juan

1 April - Dan Chiras - Lenexa

3 April - 1-Day Basic Solar PV Workshop - Columbia

5 April - Dan Chiras - Columbia

10-11 April - Eco Expo

14 April - Green

17 April - 1-Day Basic

18-19 April - 2-Day Inter

25 April - Earth Da

8 May - 1-Day Basic Sol

15 May - St. Louis R

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Enhanced promotional opportunities through Show Me Solar are available for your Solar Business. For further details [click here](#)

[Advanced Energy Corporation](#) - Specializing in solar electric systems and solar lighting. Serving Sedalia, Warrensburg and Columbia.

[Advanced Energy Solutions Group](#) - Specializing in solar sales, installation, and training. Serving 8 states including Missouri.

[Amerigy](#) - Specializing in solar thermal and solar electric systems. Serving Springfield and the SW Missouri Region.

[The Energy Savings Store](#) - Specializing in Solar PV, Solar Thermal, Solar Outdoor Lighting, Solar Air Heating, and Wind – both On and Off-Grid. Serving the Midwest from a showroom in Lenexa, KS and offices in St. Louis, MO.

[Mid-America Renewable Energy Solutions](#) - Specializing in solar PV, solar thermal, solar pool heating, small wind, geothermal and biomass applications. Serving Missouri and Kansas.

[Missouri Solar Applications](#) - Specializing in solar electric systems. Serving the Midwest region.



Our Energy Raiser Goal

- < \$4,000/kWh installed
- < \$2,000/kWh after \$2/Watt Rebate (60 days)
- < \$1,400/kWh after 30% FITC (upto 2016)
- -\$113 after 10 years of Netmetering
(4.5 Avg PSH & \$0.08/kWh @ 3% Inflation)
- < 10 year Simple Payback = > 10% ROI
- Even better economics for businesses
due to FITR (90 days) & accelerated
depreciation (50% after 1 year)



Show Me Solar Energy Raisers

American Renewable Energy Initiative

Page 76, Solar Today's Get Started 2010 Special Issue



Photo Credits: Jeffrey Owens, Show Me Solar, 2010

Servicemark Pending: American Renewable Energy Initiative (AREI)



Solar Energy Raiser

www.ShowMeSolar.org

- Date of Next Energy Raiser?
- Location of Next Energy Raiser?
- 3 days of Advanced PV Training
- Discount for Professional Members
- 2 days of Hands-on Installation
- Open for Viewing to Basic Members
- Lunch Available or Bring Your Own