Residential Energy Efficiency & Renewable Energy Forum

3 May 2012

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http://www.santafecounty.org/public_works/energy

Tonight's Program 6:00-7:30

- Home Energy Efficiency
- Renewable Energy
  - Solar → solar electric "PV" and solar thermal
  - Small wind systems
  - Ground-coupled heat pumps
- Financial Benefits of EE and RE
- Financing Options
  - Homewise Energy Improvement Loans – Rachel Silva
- Q&A
- One-on-one Time with Businesses

Home Energy Efficiency

- "Efficiency": technologies
- "Conservation": behavioral
- Both very important!
- "Building Envelope"→ walls, ceiling, attic, doors windows
- Major Appliances→ furnaces, refrigerators, clothes washers/ dryers, space cooling
- Lighting and "Plug Loads"→ CFLs, computers, TVs, stereos

Building Envelope→ Goal: Reduce/eliminate air leaks and increase insulation

- **Quick, simple, inexpensive "weatherization" → caulking, weather stripping, thresholds, window films (for single pane)**
  - **< $30 in materials**
  - **< 2 hours of your time**
  - **Use "bic lighter" test in winter to check for air leaks around doors and windows**

Bubble wrapping single pane windows

Comprehensive Whole House Building Envelope Improvements

- "Building Performance Institute" Home Assessment → recommended improvements
  - **Seal air leaks around doors, windows, attic, ventilation system/duct work, etc.**
  - **Add insulation to walls, attic, roof, crawl space**
  - **Replacing single pane windows is generally more of a comfort issue than a cost-saving issue (unless a/c use)**
  - **Furnace, a/c unit, water heater "tune up" or replacement**
  - **Appliances, lighting, plug loads**

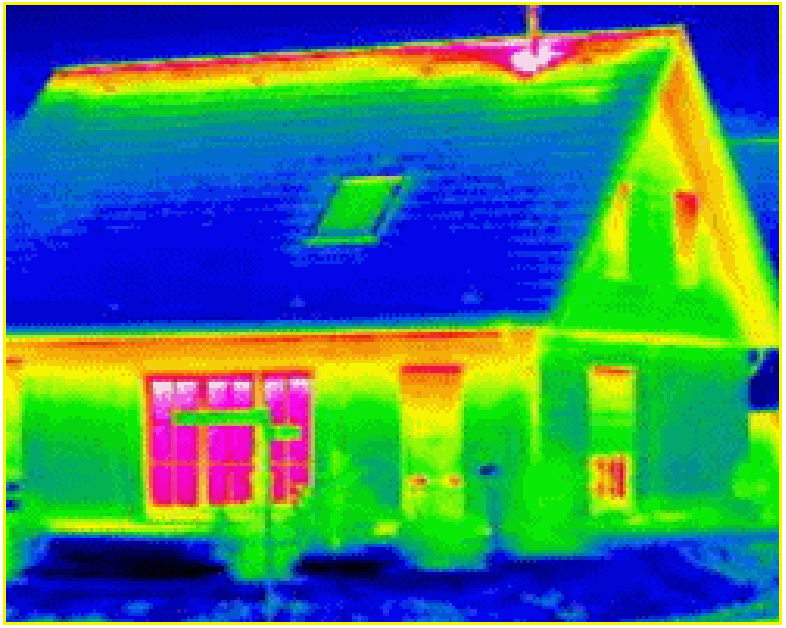
SFCC
SANTA FE COMMUNITY COLLEGE

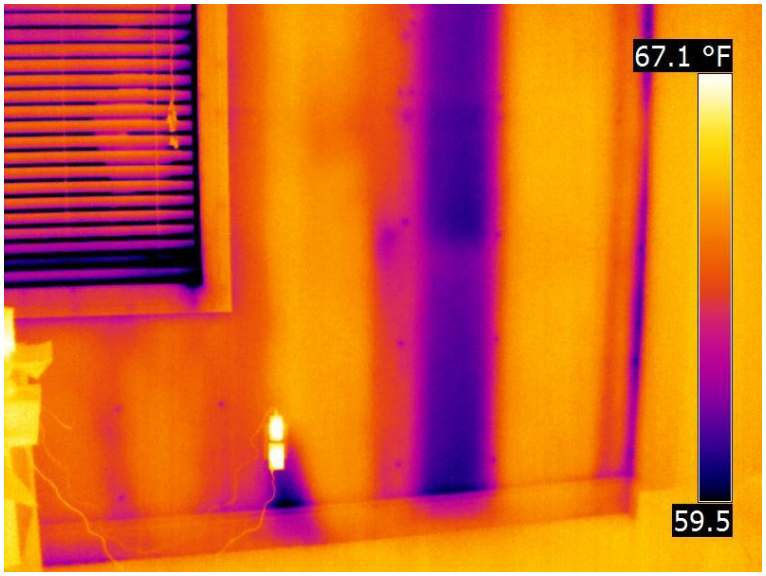
BPI Building Performance Institute, Inc.

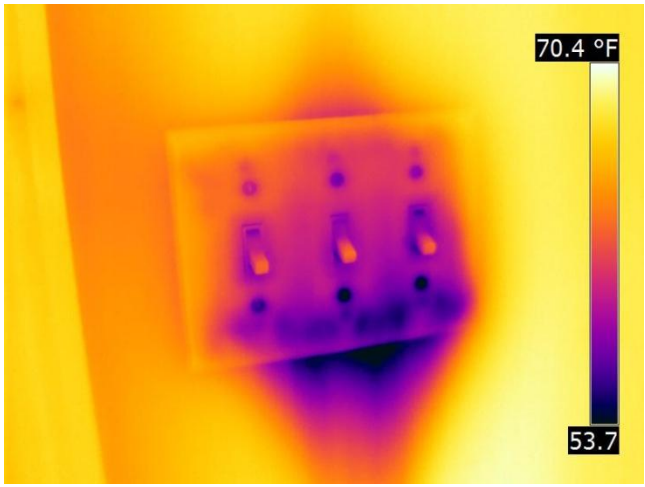
Sustainable Technologies Center – Green Building Center of Excellence


PLUMBING STACK VENT
RECESSED LIGHTS
ATTIC HATCH
RECESSED LIGHTS
CHASE
KITCHEN FAN VENT
ELECTRICAL OUTLET
DRYER VENT
CRAWL SPACE
OUTDOOR FAUCET
Air leaking into the house from outdoors.
Air leaking from inside the house to the outside.

Thermal Infrared Imaging Reveals Air Leaks and Poor Insulation







Assessment: Blower Door Testing Finds Air Leaks

Loose Insulation Doesn't Always Stay Put!

A Word of Caution When Making the Home "Tighter": Carbon Monoxide

- Sealing air leaks reduces intake of outside fresh air.
- NG and Propane Furnaces and Water Heaters: Incomplete (i.e. inefficient) combustion produces **carbon monoxide**.
- Purchase and use an inexpensive CO detector→ <$20
- Similar to a smoke alarm
- Whole-house air sealing: a professional may recommend positive fresh air supply (quiet, low-wattage bathroom fan cycling on and off)
- Check forced-air furnace for "flame flicker" when fan kicks on.

HVAC & Major Appliances

Staying Cool in a Warming Climate

- **Refrigerated a/c uses 4x the amount of electricity as an evaporative cooler.**
- **Santa Fe's high elevation and low humidity make evap. coolers ideal → water usage concern is over-stated.**
- **Fans → ceiling and portable are effective at cooling.**
- **Shade south & west-facing windows – trees, awnings, portales, etc.**
- **Curtains and window films.**
- **Passive cooling → open windows when it's cool.**
- **If you must buy a/c→ & consider targeted space cooling with a window unit.**

Portable Evap Cooler

Lighting and "Plug Loads"

- Compact fluorescent light bulbs (CFLs) → ¼ the amount of energy
  - Range of light qualities – warm to cool
- Contain a small amount of mercury – care must be taken with breakage and disposal http://epa.gov/cfl/
- LED lights → now entering market, use less than CFLs
- Plug Loads→ computers, stereos, TVs
  - Aren't really "off" when they're "off"!
  - "Phantom Loads"- small but add up cumulatively (24/7/52)
  - Turn-off appliances at power strip.

How much energy do my appliances and plug loads use?

- See PNM's web site: http://www.pnm.com/customers/energy_calc
- Check out a "Kill-a-Watt" meter from your local library
  - Downtown branch
  - Southside branch
  - Eldorado

Electric & Natural Gas Utility Incentives

- **NM Efficient Use of Energy Act requires utilities to have aggressive EE programs**
- **"Negawatts" are much less expensive than megawatts!**
- **EE can be acquired for 2-5¢/kwh vs. 10+¢/kwh for a new power plant**
- **http://www.pnm.com/rebates/home_rebates**

- **http://www.nmgco.com/Residential-Energy_Efficiency**

NM Gas Co. Incentives

- Low Flow Showerheads: $7
- Energy Star Water Heaters: $100
- Tankless Water Heater: $300
- >R-19 Insulation: 25% of cost, up to $500
- High Efficiency (AFUE 90) Furnace: $200
- Energy Star Home: $500

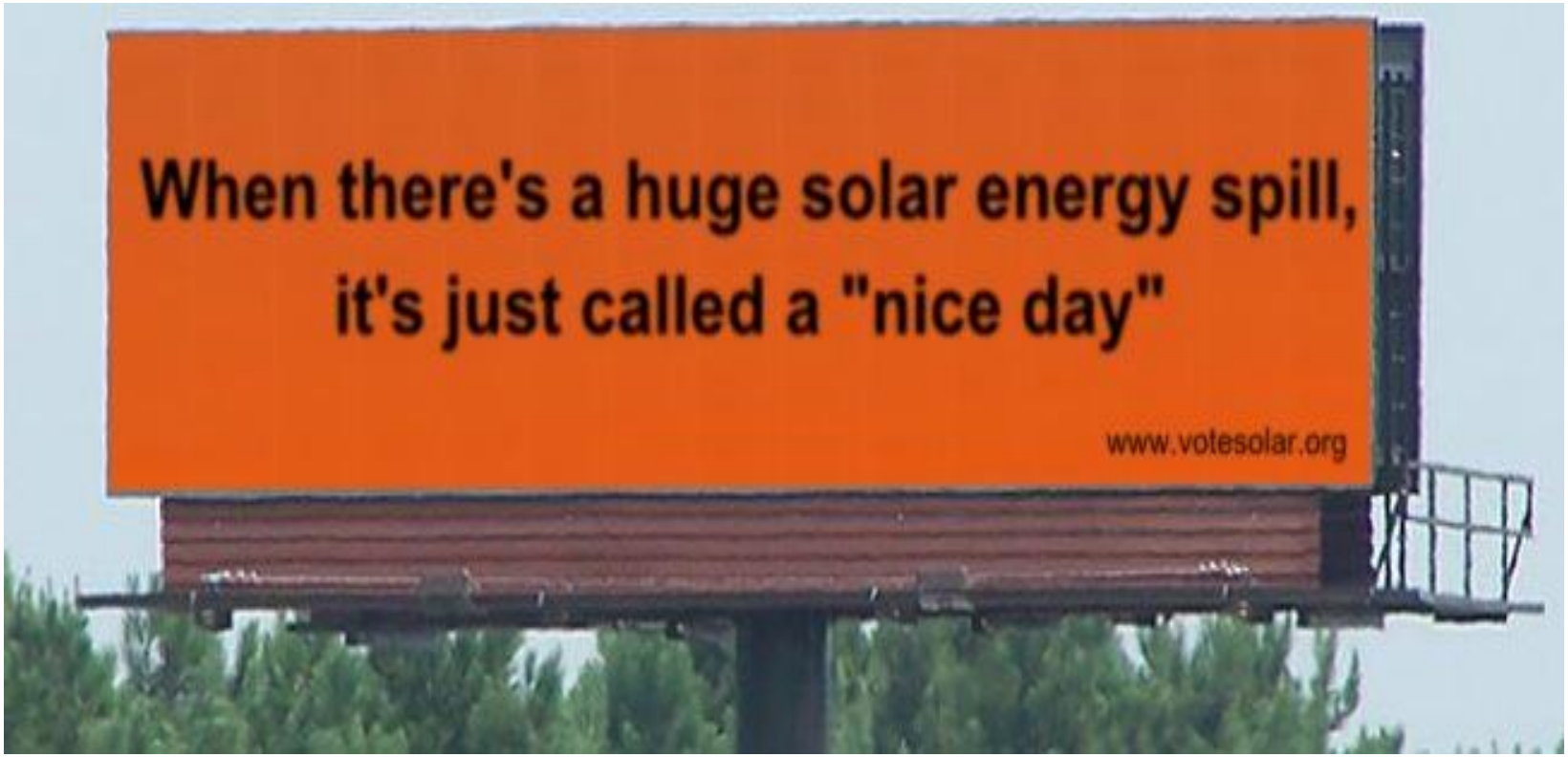
PNM Incentives

- Old refrigerator or freezer recycling → $50
  - Old refrigerators use a lot more energy than new ones.
  - A mostly empty refrigerator (in the garage?) uses more energy than a full refrigerator.
- CFL price reduction program at selected hardware stores
- Energy Star New Home: $750

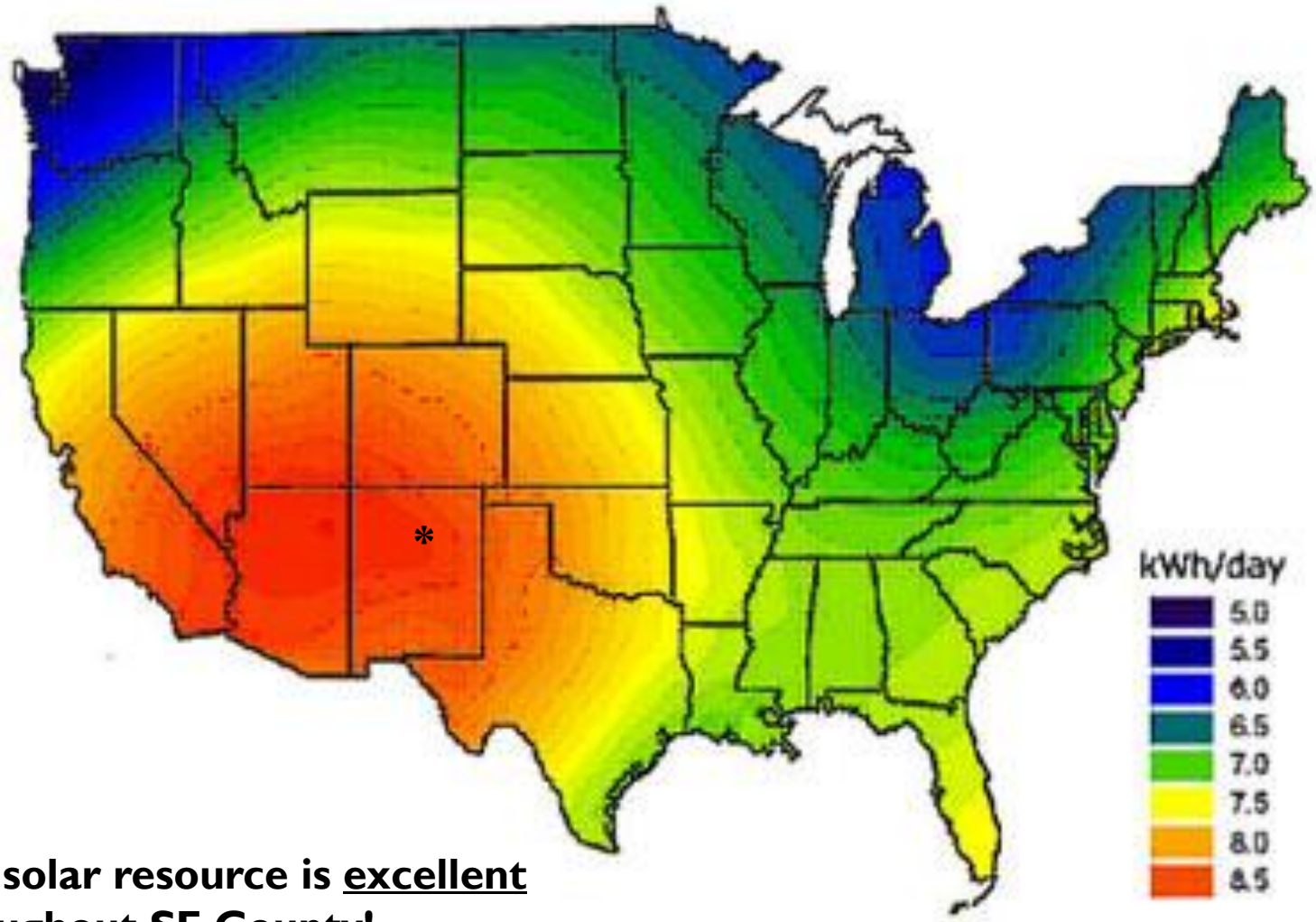
Energy Conservation → Common Sense Energy Saving Behaviors

- Lights off in unoccupied rooms
- Turn furnace thermostat down when you go to sleep or when home is unoccupied.
  - A down comforter uses less energy than a furnace!
  - Most forced-air furnaces do not take long to heat a home.
- If you have central or window a/c → use fans to be able to set the temperature a little higher.
- Dress appropriately for winter or summer!
- Turn plug loads off at power strip.
- See PNM's "energy saving tips" web page.

"Customer-Scale" Renewable Energy → Solar Power



NM: 2nd Best Solar Resource in the USA!!



Our solar resource is <u>excellent</u> throughout SF County!

Types of Solar Systems

- **Solar Electric Photovoltaics (PV)**
  - **Converts light (not heat) to electricity**
  - **Roof and ground mounted**
  - **On-grid and off-grid (need battery storage)**
  - **"Net Metering" – utility "pays" you the retail rate**
  - **Attached to roof or "ballasted" (weighted) systems**
  - **South-facing, 10-30 degree tilt from horizontal, avoid shading**
  - **2 kilowatt system (2000 watts) generates ≈ 320kw-hours (kwh) per month**
  - **$5000-6500/kw installed *before* 40% tax credits**

- **Solar Thermal**
  - **Water and Space Heating**
  - **Water heating → $7000-9000 before tax credits**

Pole-Mounted PV

Jobs: PV Installations
Stimulate Our Local Economy!

Solar Hot Water Panels

Deciding on the Size of Your PV System

- What % of your annual electric usage do you want to be generated by your solar system? 50%? 100%? → Review your electric usage for an entire year.
- How much do you want to spend? Or how big of a "net" monthly loan payment (accounting for the reduction to your electric bill) are you willing to take on?
- Do you want your system to serve as a "price hedge" against future rate increases? PNM has raised rates >30% in the last 4 years.
- Plan ahead! Are you considering an electric vehicle in the next 10 years?

Solar PV and Thermal Incentives

- 30% federal income tax credit
- 10% state income tax credit
- Exempt from paying state sales tax (GRT)
- PV Electric:
  - "Net Metering" – meter spins backward "paying" you, essentially, the retail rate (mostly 9¢/kwh but as high as 15¢/kwh for large users in the summer).
  - 5¢/kwh additional "REC" payment. Likely to decrease to 4¢/kwh in January. (Payment through 12/31/2020)
- Heating Water with Propane or Electricity? Solar thermal is an excellent choice!

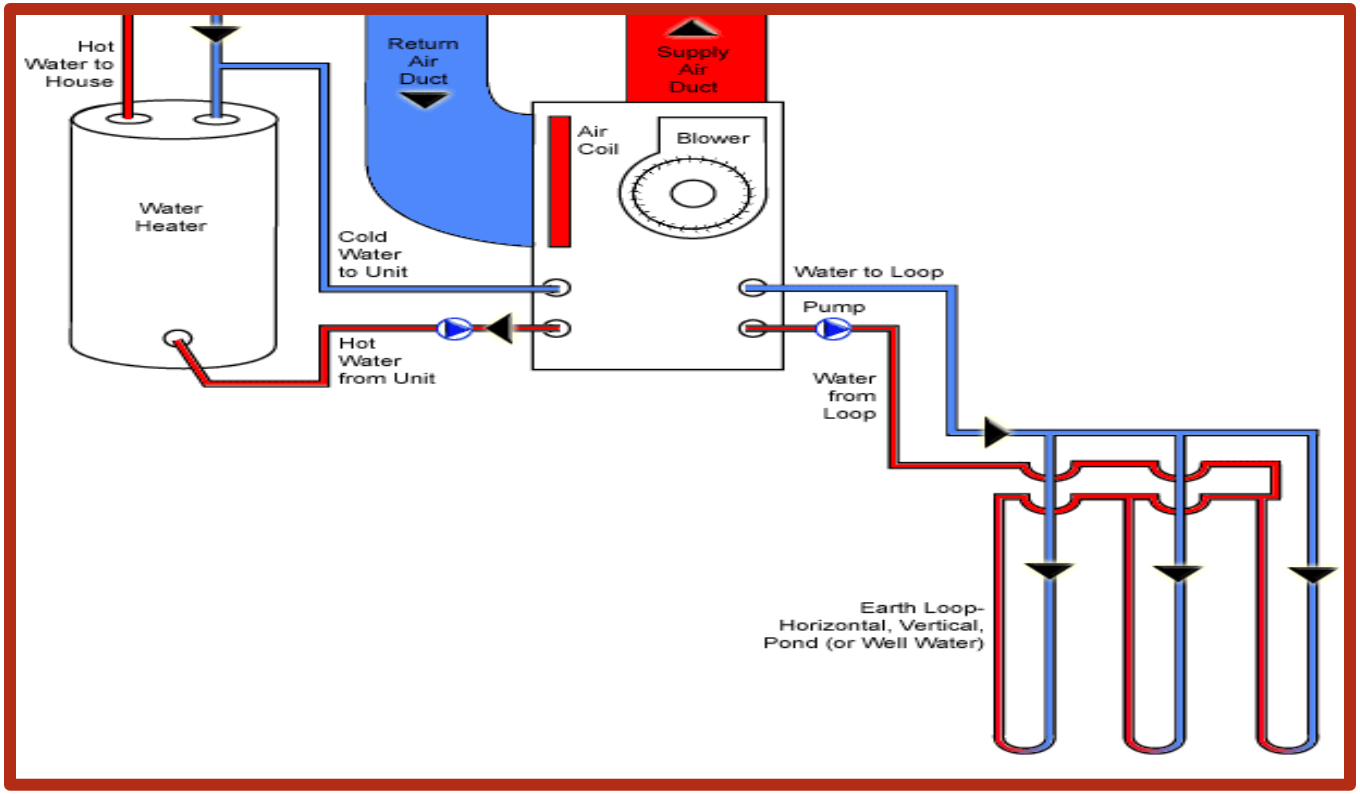
Small-scale Wind Systems

- Wind resource varies throughout the County. Excellent in some locations. Best in open, rural areas lacking obstructions.
- County is drafting wind turbine permitting requirements. Will be soliciting public input! Systems are usually 50-90 feet high.
- Best to have one year of wind data before investing.
- Check with NM EMNRD, Energy Conservation and Mgt. Division's Wind Specialist

Ground-coupled "Geothermal" Heat Pumps

- **Utilize the constant temperature (55 degrees F.) of the subsurface (6 or more feet below the ground) to heat water & heat & cool a building.**
- **Horizontal piping 6 feet deep or vertical pipe 200 feet deep.**
- **30% state income tax credit, up to a $9000 credit!**

Forced-Air: Heating Cycle



The 1,2,3s of Solar's (and EE's and other RE types') Financial Benefit

1. **<u>Immediate and Medium-term Benefit:</u> monthly reduction to your utility bills. L-term price hedge against rate increases**
2. **<u>Long-term Benefit:</u> PV systems keep generating electricity for 25+ years. Once your loan is paid off, your electricity is free, because the "fuel" is free!**
3. **<u>Long-term Benefit:</u> RE and EE increase the value and sales price of your home**

Financing Options: RE and EE Improvements

- **Gross household income < $103,050/yr? → Homewise**
  - **4% loans for up to 30 years! (Rachel's turn!)**
- **Refinancing your existing home or buying a home that is at least one year old? → federal HUD/FHA "203K" loan**
- **Neither of the above options work for you? → personal loan, 2nd mortgage, Home Equity Line of Credit (HELOC)**
- Keep in mind… the longer the loan term (or "amortization" period) the lower the monthly payments.
- County Renewable Energy Financing District "PACE" Funding? – possibly in the future with federal statutory or regulatory changes

FHA 203K Mortgage and Home Improvement Loan

- "Full" and "Streamlined" Options
- Up to $35K (for Streamlined) in improvements can be made to home. The costs get rolled into the 30 year mortgage. (≈ 4.25-4.5% interest)
- Improvements: kitchen and bath remodels, painting, new roof, whole-house EE improvements, solar PV and thermal systems, water-well upgrades, others. Not for room additions.
- Not income limited! Loan amount limited to ≈ $425K in SF County.
- Only 3.5% down payment requirement and (generally) less stringent credit requirements.

203K Loans – Continued

- 203K loans cannot be used just for home improvements. They are a home mortgage loan that allows improvement costs to be rolled into the mortgage.
- Must use a lender that does FHA 203K loans. (County web site with list coming soon)
- It helps, but it's not required to use a 203K certified contractor.
- The "Certified 203K Consultant" plays a key role in navigating the process. → Steven Bradley
- Selling your home? Consider using a 203K Consultant to assess your home prior to listing to market it as "203K improvement loan ready".

Consumer Loans and 2nd Mortgages

- Some solar companies have arranged favorable financing through credit unions or banks. Ask them!
  - 6.25%-7.75% (depending on credit score), 20 year amortization creates lower monthly payments.
  - LANB: EcoSmart Loans, 5.5% (fixed for first 7.5 yrs), 15 yr. loan http://lanb.com/Eco-Smart.aspx
- 2nd Mortgages & Equity Lines of Credit
- Ability to borrow, interest rate and loan term usually determined by one or more factors: credit score, amount of equity in home, debt-to-income ratio, loan-to-home value ratio, whether you're a member of the bank or CU, have borrowed from them in the past, etc.
- County working with lenders to expand options!

Solar Financing Examples

- 2kw PV system →$10,000 installed cost
  - Generates ≈ 320kwh/month
  - $4000 in federal and state tax credits yields net cost of $6000
  - **Reduction to utility bill (net metering and REC payment): $48/month**
- Scenario 1: Utilize one year interest free loan option for $4000 amt. of tax credit. (or, alternatively, if you have the funds, put $4000 toward the system up-front).
  - Borrow $6000 at 7% for 10 years → $70/month loan payment
  - **Net monthly cost: $22**
- Scenario 2: Finance $10,000 for 30 years using Homewise or FHA 203K (must be part of a full mortgage)
  - Homewise at 4% → $48/month loan payment
  - 203K at 4.5% → $51/month loan payment
  - **Net monthly cost: ZERO to $3!**

Q&A Time! (Recess after that)

Thank you for coming!!