Introduction
Welcome to The Home Energy Series

Who am I?

• Home Energy Nerd
• Passionate Environmentalist
• 15 Years in Renewable Energy
• 10 Home Energy Certifications
• Energy Auditor – 1000+ Home
• General Contractor, Electrician – 100+ Whole Home Projects
• Solar Sales Consultant
• Realtor & Real Estate Investor
• Enphase Regional Manager
Welcome to The Home Energy Series

Who are you?

• Who is here today? (Novice, Semi-Educated, Total Nerd)
• When was your home built?
• Who is interested in efficiency? Comfort? Solar?
• Who is already planning a project? (HVAC, insulation, solar?)
• Who already has installed solar?
• What are the main questions that you want answered?
• Who is registered in the 2\textsuperscript{nd} and 3\textsuperscript{rd} session?
Welcome to The Home Energy Series

Some background...

• Why Home Energy Education?
• Why the approach is more important than the content?

We’ll also start to address:
• What authentically are the low-hanging fruit?
• How home comfort really works?
• How does it all works together and why you care?
Introduction

Perspective for the Seminar

• You’re the best one to understand your home.
  • It’s your money.
  • It’s your quality of life.
  • You are the one who really cares the most.
  • No salesperson is any smarter than you.

• An affordably comfortable, safe and healthy home...
  • Is possible,
  • Makes financial sense,
  • And is the right thing to do.

• Knowledge is power and in this case financial savings.

• This is just the beginning or at least part of the journey.
Whole Home Approach

Building Science / Home Performance

• Everything works as a system. Each upgrade impacts the entire home.
• Big picture thinking will save you money now and in the long run.
• Examples:
  • **Combined Impact** - Insulation & Air sealing
  • **Logistical Impact** - Ducting & HVAC
  • **Financial Impact** - Solar & Roofing
Introduction

My Approach

• Have a goal in mind for where you want your home to be
  • Give up any resignation and dream a little.
  • STAY OPEN...
• Have a budget for what you’re willing to invest to get you there
  • Or a monthly investment that you’re comfortable with.
• Do the math! “Math it!”
• Consider the additional benefits...
  • Happiness, freedom, peace of mind...for 3% - 5% of the homes value.
Series Outline

Session 1: Home Evaluation – Tonight – 7/16/20
Understanding Your Home’s Energy Usage and Your Utility Bill

Understanding Your Home’s Building Enclosure and its Major Systems

Session 3: Home Energy – 7/30/20
Creating Your Whole House-Based Solar Strategy and Going Solar the Right Way
Session 1 – Home Evaluation:

Understanding Your Home’s Energy Usage and Your Utility Bill
Session 1: Intended Objectives

- Establish a foundation of energy knowledge to build upon for the remainder of the series.
- Leave you empowered to recognize your home’s biggest opportunities for energy savings.
- Understand your energy bill and how to determine the best utility rate structure for your home.
- Be a resource to answer questions about your home’s energy usage and utility bill.
Understanding Your Home’s Energy Usage

Session 1 Outline – Home Evaluation

• Understanding Your Home’s Energy Usage
  • Seasonal vs. Baseload
  • Baseload Energy Details

• Understanding Your Utility Bill and Rate Structure
  • Discount Rate Structures
  • Time-Of-Use
  • Rate Structure Calculators
  • Solar take TOU into Account
Understanding Your Home’s Energy Usage

SDG&E Tool Lending Library

- [https://sdge.myturn.com/library/](https://sdge.myturn.com/library/)
Understanding Your Home’s Energy Usage
Conservation vs. Efficiency

• Energy Conservation: The decision and practice of using less energy.
  • Turning off lights
  • Using less heating and air-conditioning
  • Unplugging appliances
  • I’m not a big proponent of suffering these days

• Energy Efficiency: Reducing the amount of energy required to provide a service.
  • Incandescent lights -> LEDs
  • Leaky ducting -> tight ducting
  • 10 SEER AC -> 16 SEER AC
  • Typically one time change / investment...ongoing thoughtless results
Understanding Your Home’s Energy Usage

Seasonal vs. Baseline Usage
Understanding Your Home’s Energy Usage

Seasonal vs. Baseline Usage

• Seasonal Loads:
  • Air conditioning
  • Heating
  • Misc.

• Baseline Loads:
  • Lighting
  • Pool pumps
  • Plug loads
Baseline - Lighting

- Lighting on average will account for 10% of your electricity usage and approx. 20% of your baseload electricity usage.
- LEDs typically use $\frac{1}{6}$ – $\frac{1}{10}$th of the electricity of a incandescent and $\frac{2}{3}$rd – $\frac{1}{2}$ of the electricity of a CFL.
- I used to say only high-use areas...now I recommend everywhere.
- LEDs are designed to last 25 Years.
- Sometimes I hear people say I’m replacing as I go...
  That will actually cost more money than doing it now.
- Cost has plummeted and light quality has greatly improved.
Baseline – Lighting - LEDs

• **Color:**
  • Color is measured in Kelvin (K). 2700 K, 3000 K, 3500 K, 5000 K, 6000 K, etc.
  • 2700 K is Warm -> 5000 K is Cool.
  • How does this correspond to human experience?

• **CRI:**
  • Accuracy of light.
  • CRI of 90+ is recommended...the higher the better.
Baseline – Refrigeration / Appliances

• An old fridge (main or garage fridge) is usually the biggest offender.
• Payback typically works for a fridge replacement.
• Let’s do some math:
  • An old fridge may use approx. 1000 kWh per year while a new fridge may use 500 kWh per year. (Some delta’s are as high as 1000 kWh – 1400 kWh -> 400 kWh)
  • 500 kWh @ an average energy cost of $.35 kWh that’s a $175 savings per year.
  • You can get a new garage fridge for less that $500 -> less than 3-year payback.

• Here are some resources:
  • http://www.kouba-cavallo.com/refmods.htm
Baseline – Pool Pumps

- Pool pumps are one of the top energy users in residential homes.
- A pool pump can use on average between 30% and 70% of your baseline.
- The “Law of Affinity” states that when you pump water at ½ the speed you use 1/8th the energy.
- Story Time: $200 per month.
- If you have a variable speed pump, re-program it...if you don’t, get one and run it right.
- ½ the speed, double the run time = Same Water Changes Per Day
Baseline – Water Heating

- Gas water heating is relatively cost-effective, electric water heating is not.
- If you have an electric water heater and it needs replacement consider a heat pump water heater.
- Make sure your pipes are insulated within 6’ of the unit
- Make sure you don’t have a recirculation pump running when not needed.
Baseline – Electric Vehicle

• Do you already have an EV? If so:
  • How many miles do you drive per year?
  • How many miles do you get per kWh?

• If you are going to / want to account for getting an EV:
  • How many miles do you intend to drive it per year?
  • Average 4 miles per kWh.

• Do the math...
Baseline – Misc.

- Fish tanks...
- Exterior lighting...
- Koi ponds / fountains...
- Kilns / shop equipment...
- Dehumidifier...
- Medical equipment...
Understanding Your Home’s Energy Usage

Seasonal – Session 2
Comfort & Efficiency

• Insulation
• Air Barrier
• Windows
• Ducting
• HVAC
• Roofing
• More...
Understanding Your Utility Bill
and Rate Structure
Power vs. Energy

• Power
  • “The rate at which work is (can be) done.” In this context: The rate of producing or consuming energy.
  • In any given moment...
  • Typical Units = Kilowatts, Watts...
    • Note: A Kilowatt = 1000 Watts

• Energy = Power x Time
  • “The capacity for doing work.” In this context: Energy is what you use or produce and it’s what residential customers pay for.
  • Power used over a period of time.
  • Typical Units = Kilowatt Hour (kWh), Watt Hour (Wh)
Power vs. Energy (Examples)

- Six 65 Watt light bulbs (Power) are operating for 8 hours.
  - \((6 \times 65 \text{ Watts} = 390 \text{ Watts})\)
  - \(390 \text{ Watts} \times 8 \text{ Hours} = 2,340 \text{ Watt Hours} = 2.3 \text{ KiloWatt Hours (2.3 kWh)}\)

- Ten 330 Watt solar panels (Power) are producing at max output for 5 hours.
  - \((10 \times 330 \text{ Watts} = 3,300 \text{ Watts})\)
  - \(3,300 \text{ Watts} \times 5 \text{ Hours} = 16,500 \text{ Watt Hours} = 16.5 \text{ KiloWatt Hours (16.5 kWh)}\)

- A Battery’s Storage Capacity is 9 kWhs (Energy) and it’s maximum discharge rate is 3 kWs (Power).
Understanding Your Utility Bill & Rate Structure

Low – Hanging Fruit

• Income Qualified Programs
  • CARE Program – California Alternate Rates for Energy – 30% Off
  • FERA Program – Family Electric Rate Assistance – 18% Off
  • https://www.sdge.com/residential/pay-bill/get-payment-bill-assistance/assistance-programs

• Medical Baseline Program
  • See Both (DR-LI-CARE)(Medical Baseline)

• Demand Response Program (TOU-Plus)
• EV Rates (TOU) & Solar Rates (DR-SES)
Tiers and Time Of Use (TOU)

• Tiers
  • Traditionally the primary rate.
  • The more you use the more electricity costs.
  • Tiers are based on base-line.

• TOU
  • Cost of electricity is based on the time of day you are using it.
  • Peak period is 4pm – 9pm.
  • Summer peak is substantially more than winter.
  • There are various rate structures.
Tiers and Your Baseline

• Think the opposite of Costco. They were originally designed to incentivize efficiency and conservation.

• Your “Baseline” is the allowance that is provided for lower cost electricity and is dependent on:
  • Climate Zone
  • Time of Year (Summer or Winter)
  • All Electric or Gas & Electric
  • [https://www.sdge.com/baseline-allowance-calculator](https://www.sdge.com/baseline-allowance-calculator)

• Baseline is still relevant with TOU Rates
Tiers And Your Baseline – Schedule DR

- Your Baseline can be calculated on SDG&E’s website:
  - [https://www.sdge.com/baseline-allowance-calculator](https://www.sdge.com/baseline-allowance-calculator)
Example Energy Bill - Schedule DR

• Let’s say you have a coastal home with gas and it’s the summer. Your baseline allowance is 270 kWh. Let’s say you use 1,521 kWh.

• Let’s calculate what your energy bill would be...
  • 270 x 130% = 351 kWh * .27801 = $97.58 (Tier 1)
  • 270 x 400% = 1080 kWh – 351 kWh = 729 kWh * .37843 = $275.86 (Tier 2)
  • 1,521 kWh – 1080 kWh = 441 kWh * .53221 = $234.70 (High Usage Charge)
  • Total = $608.14
Understanding Your Utility Bill & Rate Structure

TOU Options (TOU-DR1)

- [https://www.sdge.com/total-electric-rates](https://www.sdge.com/total-electric-rates)
- DR-SES
- EV-TOU and EV-TOU-2
- EV-TOU-5
- TOU-DR
- TOU-DR1
Understanding Your Utility Bill & Rate Structure

TOU Options (TOU-DR2)

- https://www.sdge.com/total-electric-rates
- TOU-DR2
Understanding Your Utility Bill & Rate Structure

TOU Options (TOU-DR-P)

- [https://www.sdge.com/total-electric-rates](https://www.sdge.com/total-electric-rates)
- TOU-DR-P
Comparing Plans -

Understanding Your Utility Bill & Rate Structure

Finding the Right Time-of-Use Plan
Customers are switching to Time-of-Use pricing plans. They give you more choice and control for managing your energy use. Prices are low all day except between the hours of 4 p.m. and 9 p.m. when prices are higher.

Are you On & A Limited Income?
Find out if you qualify for an energy bill discount and how economic assistance income requirements.

Comparing Plans
- Plan based on how much and when electricity is used.
- This plan has three time periods. Electricity prices are highest during on-peak periods and lower during off-peak and super off-peak periods.

Top 3 Plans by Cost
- Plan based on how much and when electricity is used.
- This plan has three time periods. Electricity prices are highest during on-peak periods and lower during off-peak periods.

Download Plans
Check Your Energy Usage
Learn more about how you use energy with My Energy.

Compare Plans
Answer a few questions about ways to save energy and update your estimates.

Energy Use Questionnaire
- Plan based on how much and when electricity is used.
- Plan has three time periods. Electricity prices are highest during on-peak periods and lower during off-peak periods.

Email In This Plan
- Plan based on how much and when electricity is used.
- Plan has three time periods. Electricity prices are highest during on-peak periods and lower during off-peak periods.

Email In This Plan
Analyzing Plans – External

- Download Green Button Data – Software Platforms
  - https://www.aurorasolar.com/
Future Design

• How you take time of use into account when designing a solar system?
• How to plan for a future electric vehicle...
• Session 3.
Virtual Energy Audit Opportunity

• You have a cell phone with a camera,
• You’re reasonably comfortable with technology,
• You’re comfortable having people seeing your home,
• Bonus: You’re comfortable setting up a light in your attic/crawlspace and bringing the camera there.

Send Email to:
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