Residential Solar Panels

HINGHAM
NET ZERO

www.hinghamnetzero.org

A Hingham home with panels installed on south-facing roof (optimal for solar)

Welcome to Hingham Net Zero!

- **Hingham Net Zero** is a new community group that has been formed to:

1. Raise awareness of the need for aggressive climate action.
2. Support the town's projects to cut emissions.
3. Lend grassroots impetus to community efforts to achieve net zero carbon emissions no later than 2050.
4. Be a clearinghouse for expertise and personalized coaching for people interested in strategies for lowering carbon footprint.

- Other towns, such as Concord and Belmont, are moving aggressively to develop and implement action plans to combat climate change.
- The Selectmen have recently commissioned a task force under the direction of Town Administrator Tom Mayo to move Hingham toward a climate action plan, building on the work of the Energy Action Committee.
- Hingham Net Zero supports and will participate in the new task force.
- Hingham Net Zero has over 100 members and is fortunate to have the experience and guidance of former selectwoman Laura Burns.
- Join us!

Our Goals Today

- Provide a solid grounding in solar terms and concepts (e.g., “net metering”).
- Help you understand how residential solar actually works mechanically.
- Acquaint you with internet links to help you get started.
- Introduce you to the concept of “two streams of value” from solar.
- Give you specific information on subsidies/incentives/loans for solar.
- Use a detailed example to help you understand the scale of solar savings, financing a solar installation and managing cash flow to maximize returns.
- Help you better understand trade-offs and risks.
- Explain how HMLP has implemented solar in Hingham.
- Generally equip you with the basic information you need to interact more effectively with solar contractors, HMLP and sources of financing.
- Note: detail on methodology/assumptions are at the end of the slide deck.

Solar is Now Cheap – and Getting Cheaper

- Increasingly affordable for homeowners
- Cost of average-size residential system has declined from$40,000 in 2010 to **about $18,000** today.*
- Federal, state and utility incentives can cover **up to 40% to 60% of the project costs.**
- Solar panels will significantly reduce or practically eliminate your electric bill.
- Even a small array on a garage roof can partially offset electric costs.

* According to the Solar Energy Industries Association

Residential Solar Has Long-Term Payback

- Useful life of solar panels can be 30-40 years (typically guaranteed for 25 years).
- Little or no maintenance/repair required (except may have to replace inverter after @10 years – around $2,000)
- Forbes study found 97% payback of solar investment when home is sold.
- Zillow estimates solar panels increase sale price of a home by an average of 4.1%.
- Median price of a home in Hingham: $823,856 X .041 = $33,778
- But: in real estate sales, no guarantees!

Incentives For Purchasing Solar

- Federal tax credit is now 26% of ***total cost*** of project.
- Total project cost may include things like moving/expanding electrical service, replacing roof, moving vents, stacks, etc.
- Federal tax credit could change (increase?) after 2020 elections
- State tax credit is flat amount calculated based on array size up to a maximum of $1,000 per installation.
- Hingham Municipal Light Plant (HMLP) has partnered with a new Massachusetts DOER program for towns with municipal utilities.

HMLP Energy Efficiency and Conservation Program – Solar Incentives

- HMLP partnership with MA Dept. of Energy Resources (DOER) combines new DOER rebate with a rebate in the form of a credit on future HMLP bills.
- MA DOER provides ***rebate in the form of a check*** equal to $.60 times the designed capacity of the system in watts up to a maximum of 10,000 watts (10kW's)/$6,000.
- E.g.: 6.8 kW system: 6,800 W X $.60 = $4,080.
- HMLP offers a matching ***rebate in the form of a credit*** on future HMLP bills based on the same parameters as the DOER rebate with the same maximums. (N.B: Not transferable if house is sold).
- Combined incentives are capped at $12,000.

Is My Roof Suitable for Solar Panels? Quick Look:

- Google Project Sunroof uses Google Maps/other data to assess: https://www.google.com/get/sunroof
- It's easy – just enter your address
- Sunroof returns overview of your roof and others in neighborhood and:
  - Average # of hours of usable sunlight per year for your location
  - # of square feet on your roof available for solar panels
- Degree of sun exposure is highlighted by shades of yellow on the roof
- Enter avg. monthly electric bill, Sunroof returns this estimated data:
  - Recommended size of solar array in kW's (based on bill, constrained by size of roof)
  - % of monthly bill solar panels will offset
  - Upfront cost after incentives
  - Estimated net savings for your roof over 20 years
  - Years to payback investment
  - Other financial data…

Solar Companies Will Fine-Tune Analysis

- Use satellite services for detailed metrics on your roof.
- Evaluate amount of sun exposure, pitch of roof, square footage available, shading etc. to evaluate suitability.
- Access latest data for average sunlight/other key variables
- Calculate optimal size, # and placement of panels
- Calculate projected relative efficiency of panels on your roof.
- Boston Solar scored my home at 87% (cut-off for solar loans is 70%)
- Panels on roofs with rating as low as 60% have been installed.
- Evaluate condition of roof/whether replacement advised
- General rule: sound roofs ten years old or less usually need not be replaced.
- Proposal typically includes percentage of your electricity usage covered.

Solar in Hingham

- Google's Project SunRoof uses overhead imagery and a variety of data sources and algorithms to estimate existing and potential solar installs
- SunRoof concludes the following about zip code 02043:
  - There are currently 20 solar installations in Hingham (seems low)
  - With 61% of the buildings in Hingham evaluated, almost 2/3 are solar viable
  - A large majority of the solar viable roofs are either flat or South facing
  - But – East and West facing roofs can be viable as well
- ***It appears that there is still a very large potential for additional cost-effective solar installations in Hingham.***

Albert Einstein Said…

…When asked why he couldn't make quantum physics easier to understand (simpler), he replied:

"Things should be as simple as they are, but not simpler".

- Residential solar is not quantum physics but can be a bit complex.
- Hang in there, "your patience will be rewarded."

Solar Power:“Enquiring Minds Want to Know”…

- Solar panels generate power in DC (Direct Current).
  - E.g., household batteries provide DC power to flashlights, smoke detectors, etc.
- Utilities transmit power over the grid in AC (Alternating Current) because it’s easier to transform to different voltages (pressures). High voltage for sending over long distances, stepped down to lower voltage for household use.
- DC solar panel output is converted into AC by a magic box, an “inverter”.
- Inverter feeds main electrical panel with “free” AC power
- kWh’s you do not use are sent out into HMLP’s grid for others to use.
- Will you still have power from your solar panels if gale-force winds on a sunny day knock out power from your utility? Are you “an island”?
- No. The power from your solar panels is stopped as a safety measure for HMLP linemen deployed to fix the outage. (This is called “Anti-islanding”)

Inverter Wired to Solar Array and Electrical Panel

- Converts DC output from Solar Panels into AC power and directly feeds main electrical panel for use in the house.
- Excess AC power from solar not immediately used goes back into HMLP grid.

How Do I Get Savings On My Electric Bill?

- Electricity produced by solar array goes to breaker panel and is available to power your home, reducing kWh's you must buy.
- Even if your panels produce *less than* what you consume, your electric bill is still reduced for each kWh you generate.
- If your panels produce *more than* what you could immediately consume, you receive a credit on your bill for each excess kWh.
  - HMLP's "Energy Credit" is the number of solar kWh's in excess of what you used times HMLP's average "wholesale" cost.
  - In effect, you become a supplier of electricity to your electric utility.
- This is called "net metering".

Solar Panels Produce Two “Streams of Value”:

1. The kWh’s produced by your solar array that ***you are able to use immediately*** and therefore ***do not have to buy*** from HMLP:
   - You’d have to pay HMLP $.17256 per kWh to buy that kWh from them.
   - So “avoided” purchases have a value to you of $.17256 per kWh.
   - @ 53% of my solar output is used immediately and represents avoided cost

2. The kWh’s produced by your solar array that you were ***not*** ***able to use immediately*** and ***fed back into HMLP’s grid*** for others to use:
   - In effect, you become a supplier of those kWh’s to HMLP .
   - HMLP credits you at its average wholesale cost per kWh: $.10756 per kWh
   - @47% of my solar output is sold back to HMLP

Monetary Worth of 2 Streams of Value

Category	Monthly kWh's	Price	Monthly $ Value	Annual kWh's	Annual $ Value	kWh's- 20 years	$ Value – 20 Years
BASELINE – PRE-SOLAR:			$150.00				
kWh's Bought	818	$.17256	$141.14	9,815	$1,693.68	196,300	**$33,873.60 (See note)**
SOLAR:							
Solar kWh's Used	383	$.17256	$68.18	4,602	$794.11	92,039	$15,882.17
Solar kWh's Sold	342	$.10756	$36.82	4,108	$441.86	82,161	$ 8,837.26
Solar TOTALS:	726		**$103.00**	8,710	$1,235.97	174,200	**$24,719.43**

NOTE: Add 20-year value of monthly Customer Charge of $8.86 ($2,126.40) and Total Baseline cost for electricity over 20 years becomes **$36,000** ($150 X 240 months)

Financial Example Using SunRoof Cost Data

(for illustrative purposes only)

Metric (Sunroof presumably uses average regional costs but sources are not specified)	Google Sunroof – Solar Array of 6.8 kW's	NOTES
Up-front Cost of Installation (DOER estimates $3.78/Watt = $25,704 for 6.8 kW array)	**$25,801**	• Maximum array size calculated by Google based on monthly electric bill and what roof size can accommodate • Sunroof cost very close to DER cost/Watt.
Federal Investment Tax Credit	$ (6,708)	• 26% of total project; a ***credit***, not a deduction
MA State Tax Credit	$ (1,000)	• A ***credit***, directly reduces state tax owed
Rebate from MA DOER	$ (4,080)	• Capped at $6,000 for Hingham
Total Incentives	$ (11,788)	• We address matching HMLP bill credit of $4,080 later…
Net Cost of Solar Installation After Incentives (Incentives cover 45.7% of Install Cost	**$14,013**	• This is the amount financed that must be offset by savings from $4,080 HMLP Credit and reduced electric bill costs due to the "two streams of value" from solar.

Example …(continued)

Metric	Google Sunroof Home	NOTES
Total Payments Made on Loan of $14,013 at 4% Over 20 years	**$20,379.74**	• Based on Monthly Payments of $84.92 for 240 months.
Value of HMLP Credit, Plus Savings On Bill Due to "Two Streams of Value" of Solar. These savings reduce the **Amount Due** on Bill that the credit wipes out & makes credit last longer.	$ 4,080.00 $24,719.43 **$ 28, 799.43**	• HMLP Credit used in 7 yrs. 3 months • Two streams of value over 20 years • **Total Savings Due to Solar over 20 yrs**.
Effective Net Cost of Loan Over 20 Years	**($8,418.63)**	• Total payments minus total savings
Net Cost (Savings) to Purchase Solar Over 20 years	**($8,418.63)**	• Savings from solar were this much greater than loan pmts. over 20 years.
Total 20 Year Effective Cost of Electricity With Solar	**($8,418.63)**	• You paid off loan for solar array plus you realized these net savings on bill.
Total 20 Year Cost of Electricity Without Solar	**$36,000.00**	• Avg. monthly bill:$150 X 240 months

Example … (continued)

- **Your total savings over 20 years due to installing solar array:**

$$\underline{\$44,418.63}$$

- Plus, for years 21 through end of guaranteed life of the solar panels, you continue to generate savings of **$103.00 per month** from the "two streams of value" of solar.
- Using guaranteed life of panels of 25 years, this is worth an additional **$6,179.86**
- **Total savings** over guaranteed life of panels (25 years): **$<u>50,598.49</u>**
- Compare to cost of electricity without solar over 25 years: **$45,000**

Snapshot – Monthly Cash Flows Over 20 Years

Pre-solar budget for monthly electric bill: A Plus B Below	**$150.00**	• **Assume @ 1,800 sq. ft. house with children but no EV or electric heating.**
A. Monthly HMLP Customer Charge	$ 8.86	• For acct. administration costs
B. Cost of kWh's (pre-solar)	$141.14	• 817.92 kWh's/month @ .17256/kWh
Monthly Payment on Loan	$84.92	• P&I on $14,013 20-year loan @4%
Monthly HMLP bill while drawing down $4,080 credit	$0	• Through 7 years 3 months; covers net cost for kWh's & Cust. Charge
Effective monthly cost for electricity **with $4,080 credit** – Yr. 1 thru Yr. 7.25	$ 84.92 (effectively, the loan payment, which is your only cost)	• **You Save $65.08 per month** versus budget ($150.00 - $84.92)
HMLP Bill Once $4,080 Credit Gone (includes Customer Charge)	$47.00 (net expenditure for kWh's plus Customer Charge)	• Years 8 through 20 ***& beyond*** • $150 - $103 solar 2 streams of value
Effective monthly cost for kWh's **after credit used** – Years 8 through 20	$131.92	• Loan payment of $84.92 plus $47.00 net HMLP electric bill
Even after credit exhausted, you're saving $'s while paying off loan!	$18.08	• $150 - $131.92 = **$18.08** • Applies to Years 8 through 20

Use Monthly Savings to Accelerate Pay-Back:

- Budget $150 per month for electric bill.
- Make extra payments to principal each month in excess of what loan amortization schedule requires, funded by monthly savings.
- For Years 1 through 8, add $65.08 extra payment to principal each month ($150 budgeted amount minus loan payment of $84.92).
- For remaining loan period, add $18.08 extra payment to principal each month (this is your net savings on electric bill post-credit.)
- New pay-off period is 12.25 years; saves @ $1,093 in interest
- After loan pay-off, new monthly electric bill **for kWh's**: $47.00
- I project $\underline{\$103.00}$/month compared to pre-solar bill of $150 ***for the life of the solar array***.

Observations, Risks and Caveats…

- Solar generates impressive savings over the long haul.
- Solar is clearly a long-term investment in your house.
- Even 13 years is a long time. How long will you be in your house?
- Currently, HMLP $4,080 credit is not transferable if house is sold.
- HMLP credit provides monthly cash flow benefit but increases amount financed.
  - If credit were a ***rebate,*** you could finance $9,932.74 over @ 6 years and be done!
  - Better yet, you might be able to self-finance or pay cash!
- Not clear in future real estate market how solar panels will be valued.
- New DOER program is limited in aggregate funding; don't procrastinate.
- Method/costs of financing are important.
- Up-front total cost of project may have to be financed for up to 14 months pending recoupment of incentives through taxes and receipt of DOER rebate.
- NOTE: If your electrical service is inside fenced area, Hingham will require moving it to ensure ease of access during a fire or other emergency.
- Homeowner insurance may increase due to increased value of dwelling (my increase:$133)
- Hingham real estate assessed value and taxes do not go up.

Solar Companies Hingham Residents Used

- The Boston Solar Company, LLC
- 55 6th Rd Suite #1, Woburn, MA 01801
- Phone: (617) 648-5601; 617-409-0161
- Boston Solar is the #1 residential solar contractor based in Massachusetts, with more than 4,000 installations in 8 years.
- Production Guarantee offers assured energy production forecasted for the first ten years that your system runs — or they pay the difference.

Solar Companies Hingham Residents Used

NuWatt Energy

400 Tradecenter Drive, #5900

Woburn, MA 01801

Phone: (877) 772-6357

Let’s Pause Here for Questions

MA Solar Loans- Go To https://www.masssolarloan.com/

- Key Steps:
  - Use the Mass Solar Loan consumer dashboard to learn about solar costs and loan interest rates under the Mass Solar Loan program.
  - Receive a price quote from a pre-qualified Mass Solar Loan installer (Downloadable List).
  - Select an installer and sign a solar system installation contract contingent on receiving a loan from a participating Mass Solar Loan lender (Downloadable List
  - Provide your tax information to the third-party income verifier via their secure online form, if you are applying for income qualification
  - Provide the Technical Confirmation to a participating bank or credit union.
  - Lenders offer 10-year fixed-rate loans between $3,000 - $35,000. Terms vary.
  - Complete other steps as prescribed on web site in heading.

About that Hingham Light Plant Bill…

- Hingham Municipal Light Plant (HMLP) has implemented net metering in a way that is a bit confusing.
- Here's how to understand the HMLP bill solar customers get:
  - The "Solar" category **(SOL)** displays your panels' total output for period
  - "Delivered" category **(DEL)** displays kWh's you had to buy from HMLP
  - The *solar kWh's you used immediately instead of/in addition to HMLP kWh's* are ***not*** included in the category "Delivered" (DEL)
  - "Excess" kWh's from solar that homeowner *did not use* are fed into HMLP grid, credited to homeowner and specified in the "Received" category **(REC)**
  - The bill does **not** tell you ***total kWh's used*** – you have to calculate as follows:

- **TOTAL kWh's USED = DEL + (SOL-REC)**

Statement # 1449469

HMLP
RESPONSIVE AND RELIABLE SERVICE

Hingham Municipal Lighting Plant
31 Bare Cove Park Drive
Hingham, MA 02043-2685
www.hmlp.com

MONTHLY STATEMENT

Inquiries concerning your HMLP bill?
Email:customerservice@hmlp.com
Tel. (781) 749-0134
Fax (781) 749-1396

[redacted]

Billing Date 04/30/2020

Account Number [redacted]

Service Address [redacted]

HISTORY

Month	KWH
Apr-20	2732
Mar-20	2694
Feb-20	3604
Jan-20	3274
Dec-19	2665
Nov-19	2556
Oct-19	2029
Sep-19	2280
Aug-19	2430
Jul-19	2192
Jun-19	2245
May-19	2113
Last Year	2647

Customer Message

Until Gov. Baker lifts restrictions please pay online at www.hmlp.com, or Town Hall dropbox, or mail using the pre-addressed envelope inside your bill.

Please stay safe, stay healthy & stay home.

METER READINGS

Billing Period 03/25/2020 TO 04/22/2020

Meter	Previous	Present	Read Date	Days	Mult	KWH	DEMAND
317202607SOL	20799	21590	03/16/2020-04/16/2020	31	1	791	
317376255DEL	35594	37262	03/16/2020-04/16/2020	31	1	1668	
317376255REC	10423	10696	03/16/2020-04/16/2020	31	1	273	

ACCOUNT INFORMATION

Previous Balance	-239.17
Prompt Payment Discount	-18.23
BALANCE FORWARD	-257.40
CURRENT CHARGES	
*Customer Charge	8.86
*Cap., Dist. and Trans.(1668 X 0.10756)	179.41
Energy Charge(1668 X 0.04000)	66.72
Energy Credit(273 X -0.10440)	-28.50
PASNY(1668 X -0.00500)	-8.34
PCA(1668 X 0.02500)	41.70
AMOUNT DUE	
Total Current Charges	259.85
Prompt Payment Discount	-18.83
CREDIT BALANCE - DO NOT PAY	-16.38

Let's Do the Math…

- SOL (Solar): 791 kWh's (Total output from my solar panels)
- DEL (Delivered): 1668 kWh's (Net kWh's I bought from HMLP)
- REC (Received): 273 kWh's (unused solar kWh's HMLP bought from me)
- ***Great – but how many kWh's did I use in total***? HMLP doesn't tell me – I'll have to figure it out!
  - DEL + (SOL-REC) = TOTAL KWH'S USED
  - 1668 + (791-273) =
  - 1668 + 518 = 2186
- <u>TOTAL</u> KWH'S USED = <u>2186</u>
- <u>SOLAR</u> kWh's I used = (SOL – REC) = 518; these were "free" kWh's.

The Economics of Selling kWh's to HMLP

- My cost for each kWh I buy from HMLP ranges from 14 cents to @ 17 cents, depending on market price HMLP pays. Can include:
  - Capital, Distribution and Transmission costs: $ .10756/KwH
  - Energy Charge (covers HMLP's purchase cost): $ .04/kWh
  - Power Cost Adjustment (a surcharge for extra cost): $ .025/kWh

  TOTAL "RETAIL" PRICE: $. 17256/kWh
- HMLP pays me its average unit cost per kWh: **$ .10756/kWh** (i.e., it's average "wholesale" price).
- When I buy kWh's from HMLP, I pay the retail price; when I sell kWh's to HMLP, I get the wholesale price.
- Oh yes – monthly fixed charge per customer for admin costs: $8.86

Note on “History”

- On left side of bill, you see a set of numbers labeled “History”
- This simply lists previous 12 months and annual total for Last Year
- Intent is to provide quick reference on kWh’s used over past year
- But: for solar customers, they are totaling SOL, DEL and REC
- This overstates kWh’s since REC are not used.
- HMLP is exploring a software change to the bill to calculate History as simply DEL plus SOL

Presenting: The Meters

- HMLP “Directional” Meter” is on the left.
- HMLP “Solar” Meter is on the right (with Solar Emergency Shut Off switch below).
- Be advised: Hingham zoning/fire safety rules mandate that these boxes be located outside any fencing to be accessible to HMLP/HFD in emergency.

- You may have to move location of your electrical service to comply.

HMLP “Bi-Directional” Meter

- Digital readout (not dials)
- Alternately flashes 3 readings:
  - DEL
  - REC
  - NET

HMLP Solar Meter:

- Measures total output of panels
- Basis for SOL (Solar) line item on HMLP Bill
- SOL was verified by referencing independent source - Solaredge (reporting firm used by Boston Solar)

The Baseline Massachusetts SMART Program

- **S**olar **MA**ssachusetts **R**enewable **T**arget Program started taking new applications May 18, 2020.
- Replaces “SREC’s” (Solar Renewable Energy Credits)
- SMART currently undergoing “emergency rulemaking”; rules could change.
- Baseline program applies ***only to customers of three investor-owned utility companies*** in MA: Eversource, National Grid, or Unitil.
- Administered by MA Department of Energy Resources (DOER)
- For residential systems (under 25kW), program provides fixed credit for each solar-generated kWh over a period of 10 years.
- Homeowners must use complex DOER “calculator” to project revenue.
- Massachusetts Legislature exempted municipal power companies from the program.

Data & Methodology for Financial Example/Model

- Google Project Sunroof sizing of solar array based on assumed **pre-solar monthly electric bill of $150.00** and size of roof
- Project Sunroof returned recommended size of array: 6.8 kW's
- Used latest 12 months of actual solar production data from my 7.27 kW array; I adjusted for difference in size using a simple factor: 93.51%
- As a baseline, I "backed into" ***total kWh's used/year*** pre-solar via simple math: ($150 – $8.86 Customer Charge = $141.14 ÷ .17256 = 8,179 kWh's X12 =9,815 kWh's/year)
- Entered my adjusted solar kWh's (used and sold) into my Excel model.
- Generated projections over 20 years for "baseline" utilization, solar used and solar sold.
- Modeling assumes HMLP pricing per kWh (.17256 and $.10756) stays constant.
- Example assumes that total cost of project can be funded up front pending receipt of tax and SMART Program incentives later.
- Assumes residual cost of project net of incentives is funded by secured home equity loan over 20 years at 4%
- Assumes cost of replacing inverter during first 20 years is expensed like a car repair.

Solar in Hingham

- Google's Project SunRoof uses overhead imagery and a variety of data sources and algorithms to estimate existing and potential solar installs
- The Project SunRoof "Data Explorer" page explains sources/methodologies/assumptions.
- SunRoof concludes the following about zip code 02043:
  - There are currently 19 solar installations in Hingham (seems low)
  - With 61% of the buildings in Hingham evaluated, almost 2/3 are solar viable
  - A large majority of the solar viable roofs are either flat or South facing
  - But – East and West facing roofs can be viable as well
- Caveat: data for 02043 was last updated November 2018; address-specific cost/benefit data assumes old SREC program still in force (ended 2018).
- ***It appears that there is still a very large potential for additional cost-effective solar installations in Hingham.***

Leasing/Power Purchase Agreements (PPA's)

- A solar company puts panels on your roof and you "lease" them. Typical features:
  - No up-front costs
  - You pay a fixed monthly amount for using the system.
  - In return, you get a guaranteed amount of electricity at about 10% to 20% lower than your current utility costs.
  - Benefit to you is the difference between monthly lease payment and savings arising out of discounted electricity cost.
  - HMLP's Net Metering Policy includes leases.
  - Since you do not own the system, you are typically not eligible for tax credits, rebates, the HMLP $5,000 bill credit or other incentives
  - Full disclosure: we have not been able to consult with anyone who leases and therefore cannot comment on whether this is a good option. However…
  - 2013 DOER study said homeowners and ***MA realize greater benefits from directly owning the systems***, in comparison with third-party ownership/leasing.

How Does Net Metering Work?

- “Bi-directional” electric meter registers kWh’s consumed from your utility but also “spins backward” to register kWh’s you could not use that the utility received from your solar panels.

- Note that the bi-directional meter does *not* capture kWh’s your solar array produced that you were able to use immediately (you must calculate that from HMLP bill).

- Homeowner pays the utility only for the “net” kWh’s consumed.

- Conceptually straightforward. E.g., let’s assume the solar array produces 100 kWh’s in a month:
  - If homeowner immediately uses all of the 100 kWh’s, and only those kWh’s, it’s a wash.
  - If homeowner uses all solar kWh’s plus 50 additional kWh’s, she is charged only for those 50 kWh’s she bought from HMLP.
  - If homeowner consumes 80 kWh’s from solar, she receives credit on bill for 20 kWh’s
  - Typical scenario: use some of the solar kWh’s, buy some from HMLP, sell some to HMLP.

- Simple, right? More detail *later* about how your HMLP bill handles the accounting …

What More Can I Do?

- If you are concerned about the climate crisis we are facing and want to join with others to take positive action:
    - Use HNZ “Climate Coaches” for help lowering your carbon footprint with:
        - Electric Vehicles (EV’s)
        - Heat Pumps for heating and cooling
        - Solar Panels
        - Lower carbon cooking with induction cook-tops
        - Lower carbon diet
        - Composting
    - Join Hingham Net Zero or a grass roots movement in your town
    - Tell Selectmen you support the planned Task Force charged with developing a climate action plan for the town of Hingham
    - Get more involved in other HMLP policies and decisions through board representation.
    - Share your commitment with your representation at the Massachusetts statehouse and in Congress…
- Rally friends and neighbors!

More Questions…