Electrifying Existing Buildings: The Role of Incentives

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Weatherization vs Electrification
Use of Variable Capacity (VC)

- Loop field costs are not “PER TON” or “PER FOOT” – typically, they are standard
- Heat Pump costs are not massively different between 3-5 ton units (ASHP or GSHP)
- Industry has access to VC Forced Air, Hydronic, AND Mini Split units (ASHP or GSHP)
- “Cost Savings” to reduce from a 5 ton to a 4 ton is roughly $1,200 on average (vertical can be slightly higher due to market/site conditions)
- Current Rebate Structure means pricing does not change to the customer
- If a customer has limited dollars to begin with, it becomes a choice:
  - weatherize or electrify
- How about those electric Rates!!!

Incentives to Grow Geothermal (the Dirt)

- Incent the thing that makes Geothermal Go – the Ground, otherwise it's just a heat pump – The loop is the only thing that insulates customers from rate increases
- The loop is the part that takes the most varied and highly skilled workers to install – especially drilling
- All utilities know their cost for a new gas connection – apply that directly to the loop contractor for installing a new loop – $10-20k – immediately reduces OOP for contractors/homeowners
- Communal/TEN can be a method BUT they come with a MUCH higher cost per unit installed as opposed to the loop per single family home. Interconnection of homes requires a massive amount of additional work – pipes/pumps/maintenance/redundancy/failure points.
- Workforce Development – The more loops we put in, the more companies will hire and train – a qualified driller can make upwards of $150k plus Benefits

Why can we focus on Electrification 1st?

- Methods of installation have changed in the last 5-10 years
  - Standardized Loop field, Variable capacity, DHW
- Pricing has changed – Standardization has lowered labor costs
  - Equipment costs have risen, drilling costs have risen
  - Rebates have levelized pricing across a range of capacities
- Monitoring gives us proof of concept and accountability
  - 1 Package fits most (single bore, single unit) – 30-60kbtu homes (95% of projects)
  - Symphony gives us real-time and yearly energy usage (no time for this presentation)
- We know that variable capacity systems are the best use of dollars relative to any other investment by any metric
- Variable capacity allows for future envelope improvements (compressor turns down to match smaller load)
- Electrification of a home IS permanent – 100% carbon avoidance
- Peak Avoidance!!! This is the biggest impact to electric side

Department of Energy – Average Savings and Cost

U.S. DEPARTMENT OF ENERGY

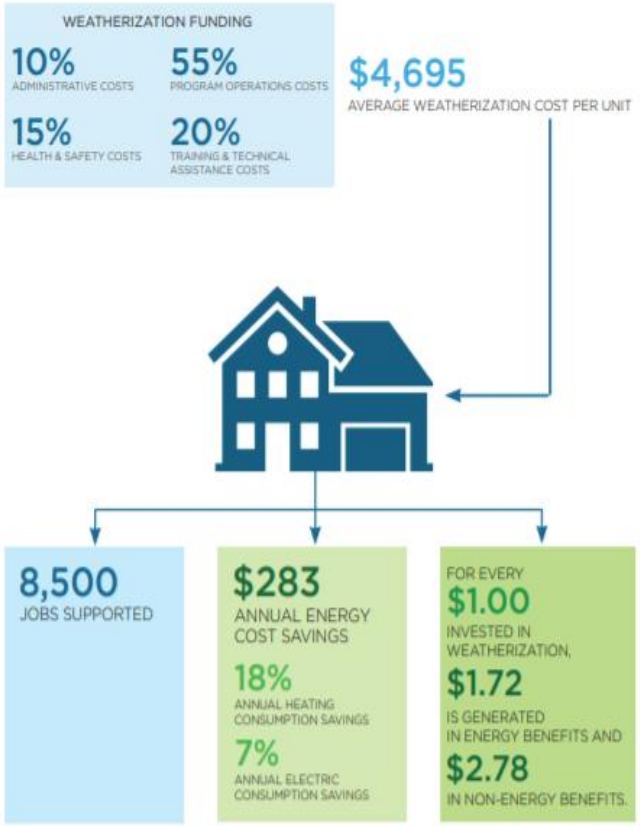
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Weatherization Works!

The U.S. Department of Energy's (DOE) Weatherization Assistance Program reduces energy costs for low-income households by increasing the energy e ciency of their homes, while ensuring their health and safety. The Program supports 8,500 jobs and provides weatherization services to approximately 35,000 homes every year using DOE funds. Through the weatherization improvements and upgrades, these households save on average $283 or more every year (*National Evaluation*).

Weatherization In Action

Locally-based and professionally trained weatherization crews use computerized energy assessments and advanced diagnostic

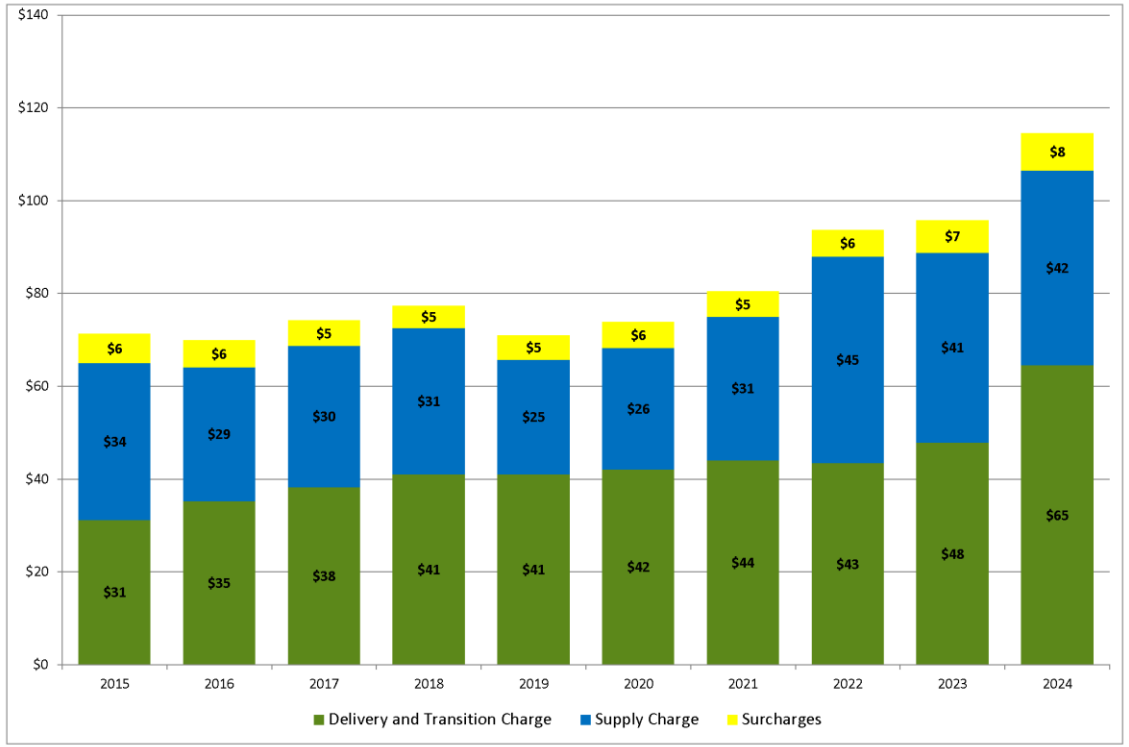


$4,700 average cost per Unit
$283 per year average savings
16.6 year average payback
18% average savings per unit

18% savings on 97mmbtu home = 79.5mmbtu overall
17.5mmbtu savings = roughly $164 in savings @ $.94/therm

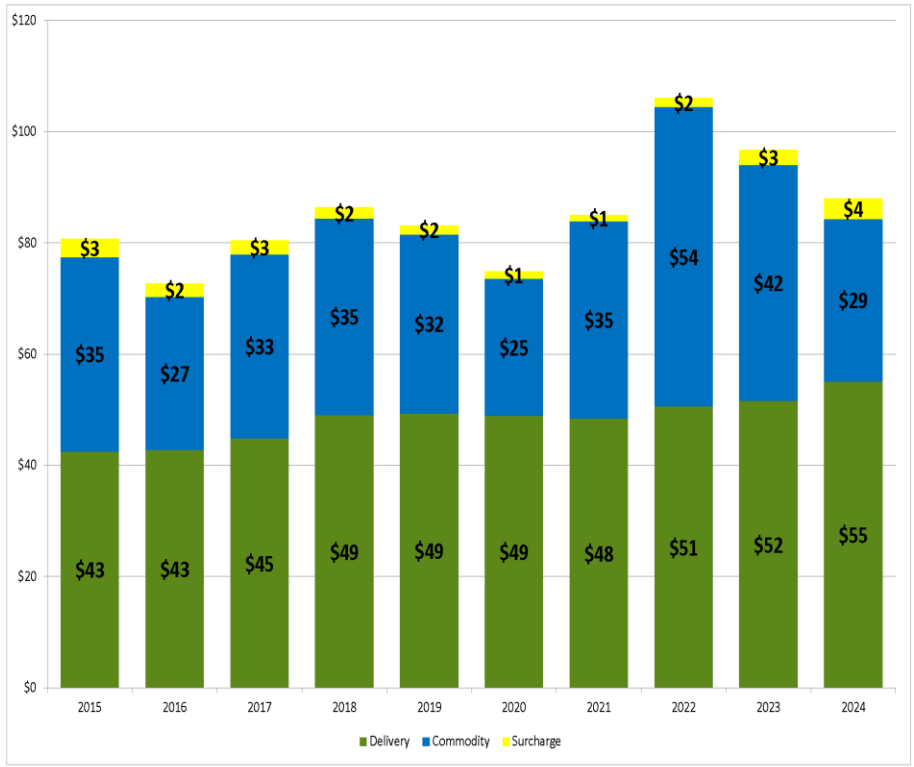
NYSEG Rates – Electric vs Gas – 10 Year History

NYSEG Electric – 600kwh/month - $.11 in 2015 to .19 in 2024



https://www.nyseg.com/w/residential-electric

NYSEG Gas – 1,000 Therms Annually - $.97/Therm in 2015, $1.056/Therm in 2024



https://www.nyseg.com/w/residential-gas

Sizing Example – How do we impact load and homeowner costs

Seasonal Heat Load of Home	Gas at 90% Efficiency		Cost @1.88/Therm	Savings at 20/40% Reduction in Load	If the goal is to reduce Gas usage, extend the life of the grid - we understand why this is of high value but it's pushing today's problems into the future!
100,000,000	111,000,000.00	Purchased BTU	$2,086.80		
80,000,000	88,800,000.00	Purchased BTU	$1,669.44	$417.36	
60,000,000	66,600,000.00	Purchased BTU	$1,252.08	$834.72	
*In order to supply 100mmbtu, need to buy 111mmbtu with 90% efficiency					

Seasonal Heat Load of Home	GSHP Savings/Cost			Savings at 20/40% Reduction in Load	
	Convert to KWh	Geo at 3.8 COP	Cost at $.24/KWh		
100,000,000	29,308.32	7,712.72	$1,851.05	$235.75	Savings vs Nat Gas
80,000,000	23,446.66	6,170.17	$1,623.73	$227.32	Reduce from 5 to 4 Ton
60,000,000	17,584.99	4,627.63	$1,110.63	$740.42	Reduce from 5 to 3 Ton

Seasonal Heat Load of Home	ASHP Savings/Cost			Net Savings due to 20% Reduction	
	Convert to KWh	ASHP at 2.2 COP	Cost at $.24/KWh		
100,000,000	29,308.32	13,321.97	$3,197.27	-$1,110.47	Savings vs Nat Gas
80,000,000	23,446.66	10,657.57	$2,557.82	$639.45	Reduce from 5 to 4 Ton
60,000,000	17,584.99	7,993.18	1,918.36	767.35	Reduce from 5 to 3 Ton

Every Million BTU's saved only saves a small % once a home is converted to electric
The biggest "Bang for the Buck" is eliminating fossil fuel. NG vs ASHP is an exception typically (operating cost). Carbon avoidance is 100% no matter what heat pump goes into the building.
*All rates from NYSERDA Site/reports – NYS Average

Pricing Exercise

Variable Capacity Geothermal System

- Average Cost of $23,000-28,000 after incentives
  - Forced air, Hydronic, Geothermal Mini Split
- Saves homeowners 20-30% vs Nat Gas/AC
- Saves close to 70% operating costs vs Propane/Fuel Oil
- 100% removal of fossil fuel in the home…….FOREVER
- Heat Pump has 25yr life expectancy
- Ground loop replaces fossil fuel FOREVER
- Properly designed systems will not need Aux KW

Variable Capacity ccASHP

- Average cost of $15,000-20,000 after incentives (whole house solution)
  - May require fossil fuel or KW backup
- Cost more vs Nat Gas, eliminates carbon
- Cost to insulate/air seal - $10,000-15,000
  - A lot of customers see this in form of “free money” through weatherization programs
- Saves around 47% vs Fuel Oil/Propane
- Heat Pump has 15yr life expectancy

Geothermal – The real story

- Cost – Everyone wants to discuss
- Heat Pumps – $15-25k to homeowner – tonnage does not change this much ~$1,500 difference between 3 and 5 ton
- Loop - $12,000-$20,000 – Vertical/Horizontal – Casing can matter – not much with standard loop
- Install/Profit - $10,000-20,000
- Incentives currently work for the “box” 5 ton System, which ranges between $7500-25,000, depending on the utility
- 25% NYS – Up to 5k
- 30% Federal – uncapped after utility rebate
- $60,000 High End System nets at around $26,000

Pricing is average of Western NY Geothermal Installers – holds accurate into Albany, Downstate is more expensive

What if…..

- Utilize Weatherization programs as an Either/Or option
  - Why not allow that $10-15k for air sealing/insulation to be used for a Ground Source Heat Pump Installation – Best Bang for the Buck!
- The loop was incentivized
  - What if the loop was incentivized the way air sealing/insulation/heat pump boxes were?
- What if ALL of it happened? – All money is being spent currently in NYS
- $60,000 Installation – best system, vertical closed loop
- 10-15K Loop – incentivizes drillers to invest in this business
- 10-15k Reduction credit (weatherization) – eliminate gas and peak KW
- 10k Heat Pump Credit – We already do this
- $30,000 Out of Pocket before tax credits, $16,000 after incentives (high end)
- $20,000 Out of Pocket before Tax Credits, $9,000 after incentives (low end)

Questions?

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Thanks!

VANHEE Mechanical

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