

Modernizing Charlotte Energy: Transitioning to Clean Energy for a Sustainable Future



Committee Members

Deidre Holmes
Mike Yantachka
Wolfger Schneider
Jim Hodson
Rebecca Foster

Grant funded by MERP for
Green Edge Energy Solutions
Tim Post

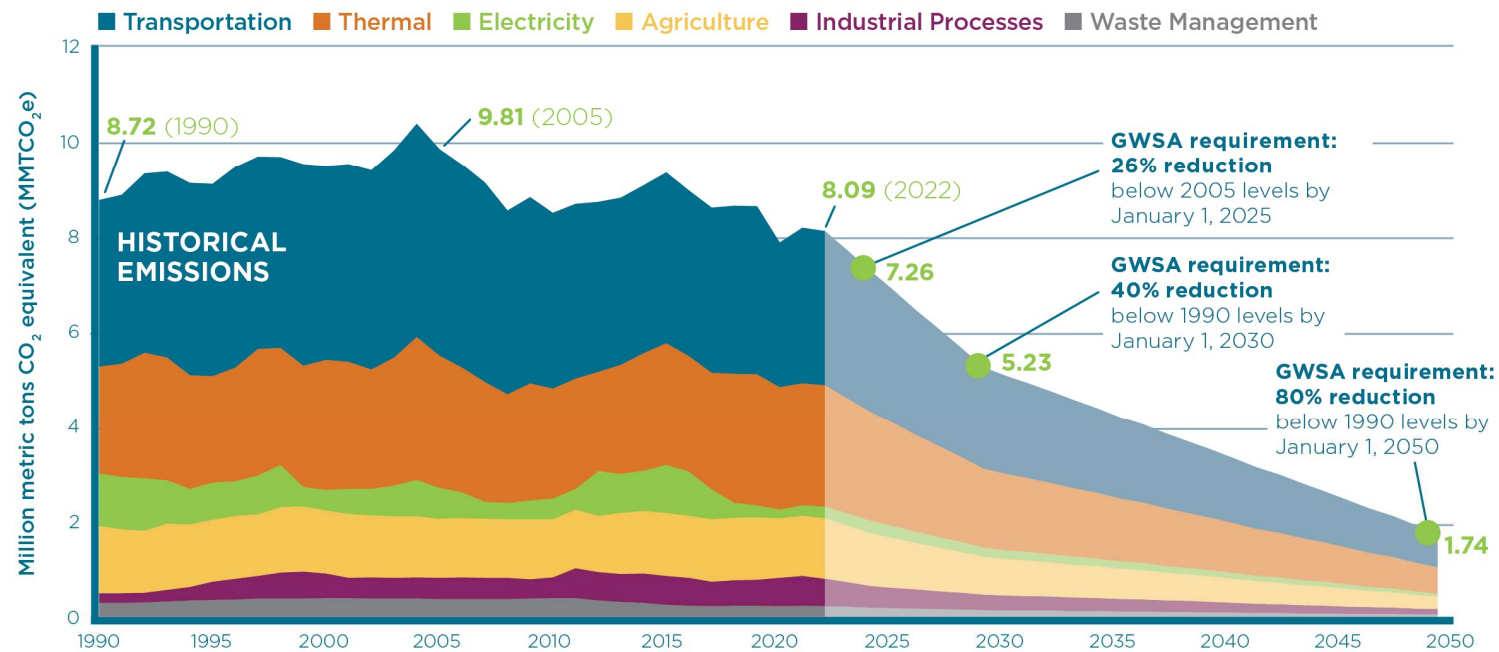
What is the Energy Modernization Project

A project that looked at all the energy consumption for town buildings and assessed whether tax savings and/or environmental savings can be achieved while meeting town and state goals.



Global Warming Solutions Act Requirements

Vermont's historical GHG emissions and future requirements



Equipment
Commitments
Last 15-25
Years!

The Status Quo

With Charlotte's current mix of Town properties, over the next 25 years, Charlotte taxpayers will spend \$1.12M in fossil fuel costs*, \$374K in electricity**, and emit 3.12M lbs of carbon, and polluting particulate into our immediate environment.



One Gallon of fuel produces about 20lbs of CO₂ or ~300 balloons worth of CO₂ that stays in the atmosphere for hundreds of years if not sequestered.

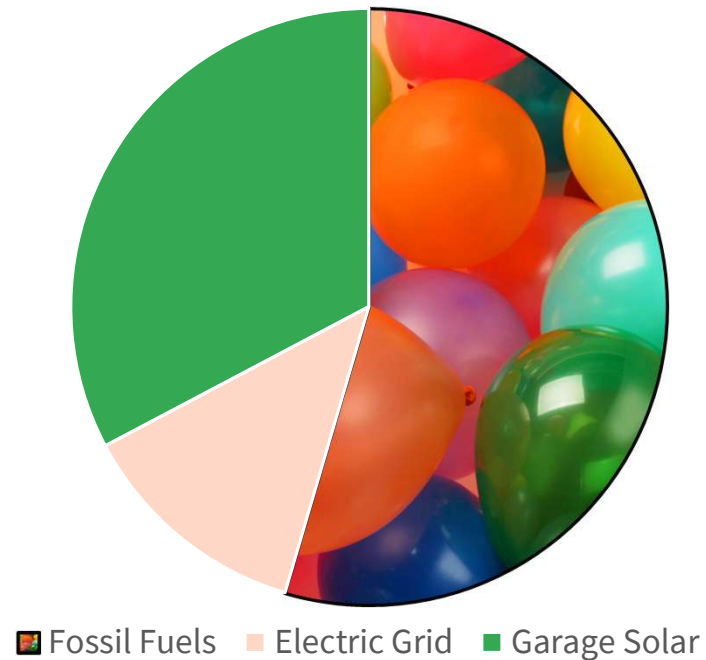
* 3% energy inflation

** Above and beyond the town solar garage

Note: Equipment (\$ not incl.) will require in-kind replacement as well during this time period

Current Energy Infrastructure

Town Building Energy Mix

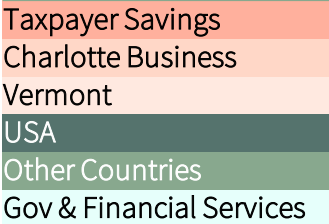
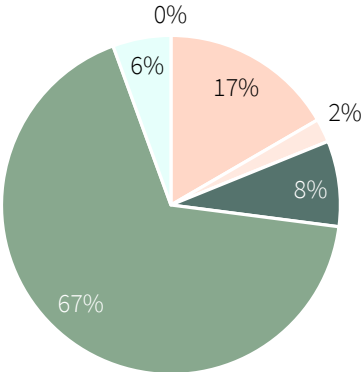


- Aging Equipment
 - Town Hall, Sr Ctr, and CFRS has aging heating and cooling equipment
 - Charlotte's current energy infrastructure is overly dependent on oil for heating.
- Economic Challenges
 - Fuel and electricity is imported, volatile, and at the mercy of state and federal policy decisions. Costs will rise unless we lock in energy rates.
- Environmental Concerns
 - The environmental impact of oil usage raises concerns regarding pollution and climate change.

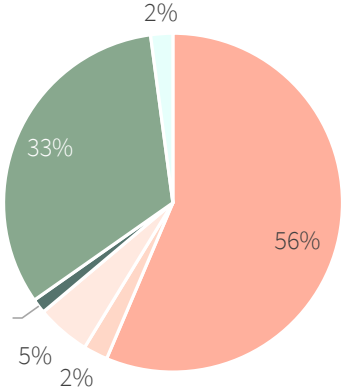
*Does not include road maintenance fleet fuel

Spending Reduced AND Reallocated

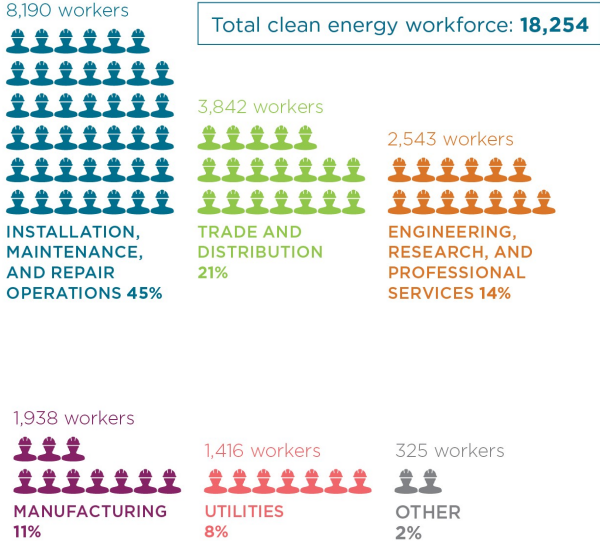
Status Quo



10 Yr Green Lease With Incentives



Vermont's clean energy workforce



Transitioning Helps Taxpayers, Domestic Businesses and Environment

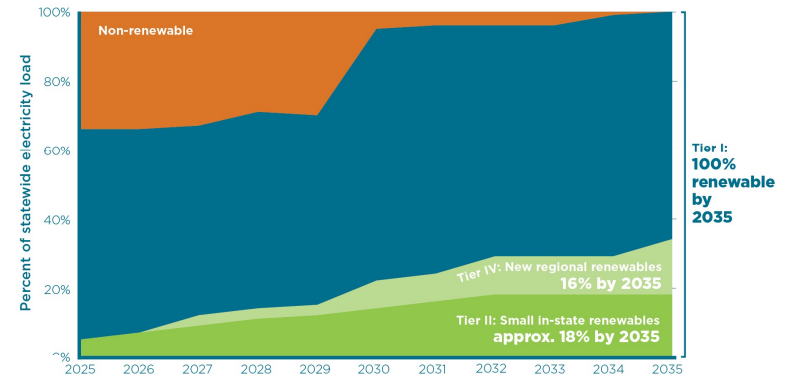
*Approximate HVAC Model Only, Solar Model will grow USA slice if panels and racking bought domestically

Electric Market Forces

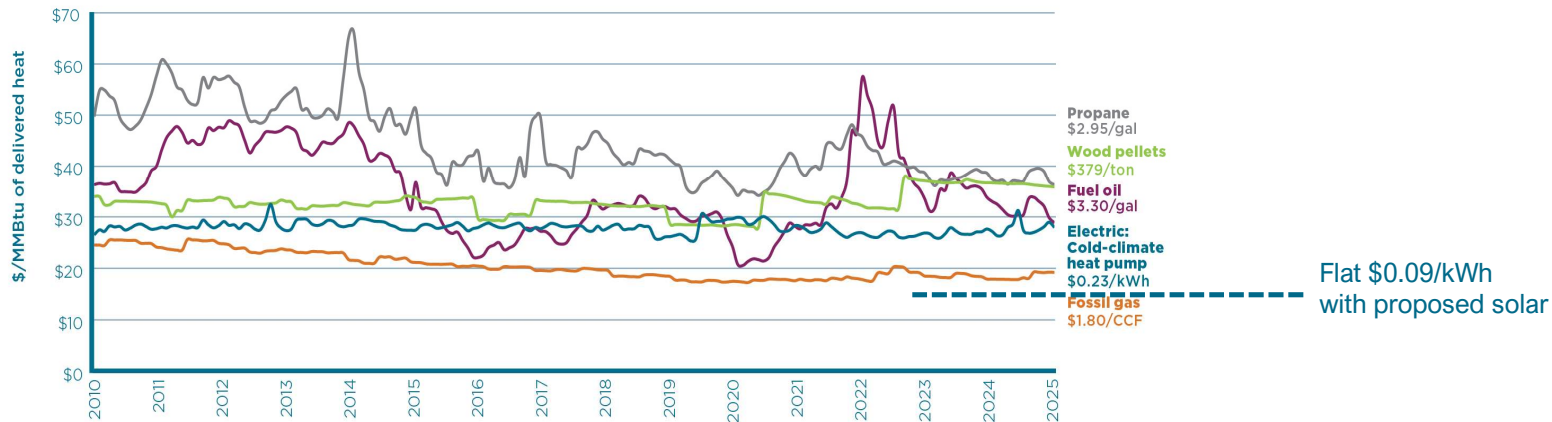
Act 179

- Moves the overall renewable energy requirement for utilities from 75% to 100%
- Moves the in-state renewable energy requirement for utilities from 10% to 20%

Updated Vermont Renewable Energy Standard (Act 179) requirements



Cost comparison of different heating fuel options over time



Financial Model Electric Assumptions:

4-6% stabilizing after 2035

* Fossil fuel cost does not include apx \$200K cost Charlotte would impart onto the environment

Regulatory Forces



June 2024 State legislation changed the economics of solar implementations



30% Federal incentives are available **for now but require commitment THIS year**



Commitment to Town plan & State energy goals require more immediate action



Environment & Lake Champlain is stressed. If not us, then who?

- Now = ~\$76K or more savings compared to post tariff / incentives future
 - Financing is trending unfavorably with time
- Fuel and Electricity projections less certain with tariffs, AI, and Global Conflicts
 - Group Net Metering changes
- Equipment supply regulation changes & tariff changes

Aesthetic Choices

Tracking Array

Ground Mount

Roof Mount

All locations identified as potentially workable. Not all locations will be necessary. Pending cost/performance analysis and aesthetic review. No decisions have been made.



CVFRS Property Is First Choice



Aesthetic & Best Use

Minimal visual Impact. Not competing for best use.

Sun Exposure

No Tree Removal and East West Compliments Town
Garage Exposure

Access To Grid

Adjacent to other properties served for Net Metering
Rules

Proposed Approach Part 1 – Change Energy Supply

- Use CVFRS To Host 80KW Solar Array
- Replace Fuel Heating Energy with Solar Electricity Except for Firehouse Garage Floor
- Replace Grid Electricity with Low-Cost Solar
- ROM Quotes \$220K



From This



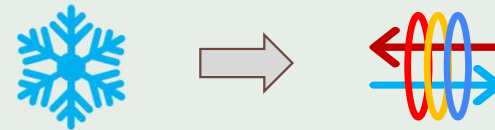
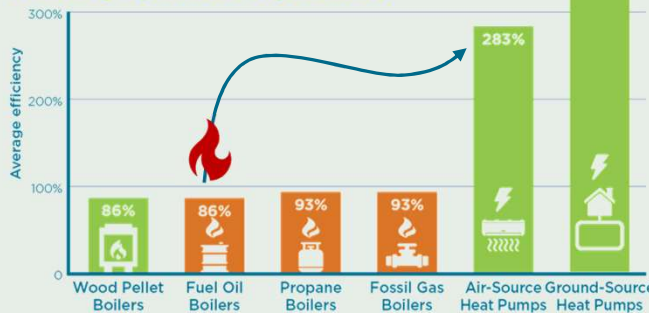
To This

Proposed Approach Part 2 – Overlay* Efficient HVAC

- Use Heat Pumps in Town Hall, Sr Center, and Firehouse Living Area Instead Of Fuel Furnaces
- Use More Efficient Heat Pumps in Town Hall, Sr Center, and Firehouse Living Area Instead Of Air Conditioning.
- ROM Quotes \$112K



Average efficiency: New residential heating systems (hydronic)



Use Same Heat Pump to Cool

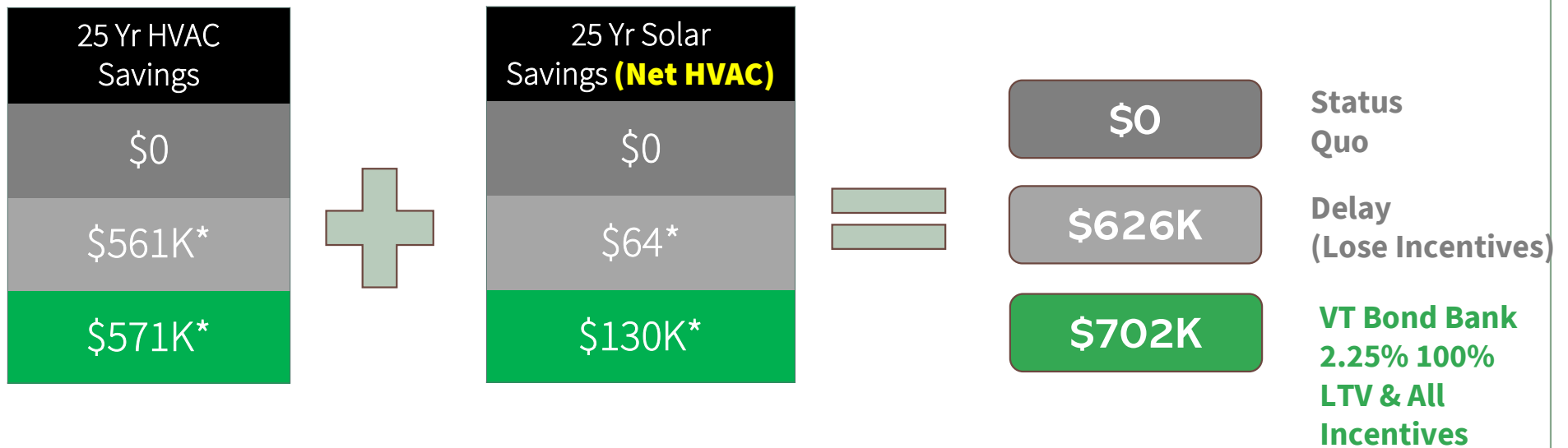
*The proposed keeps existing equipment as backup and extends life significantly until it ages out. A2W in CVFRS not included

Financial Model

\$702K Savings over 25 Years

- Based Upon
 - 3 Years Actual Town Fuel & Electric
 - Quotes Obtained In August
 - Considered Maintenance & Insurance
 - Net Metering Tariff Costs (kWh buy vs sell diff)
 - Incentives & Rebates
 - 3% Fuel Historical, ~4-6% Electric Inflation (PUC 179 Presentation)
 - 2.25% APR 10 yr Financing 100% LTV (Timing subject to shutdown)
 - Equipment Overlay, Not Replacement

Proposed Combined 25 yr Savings

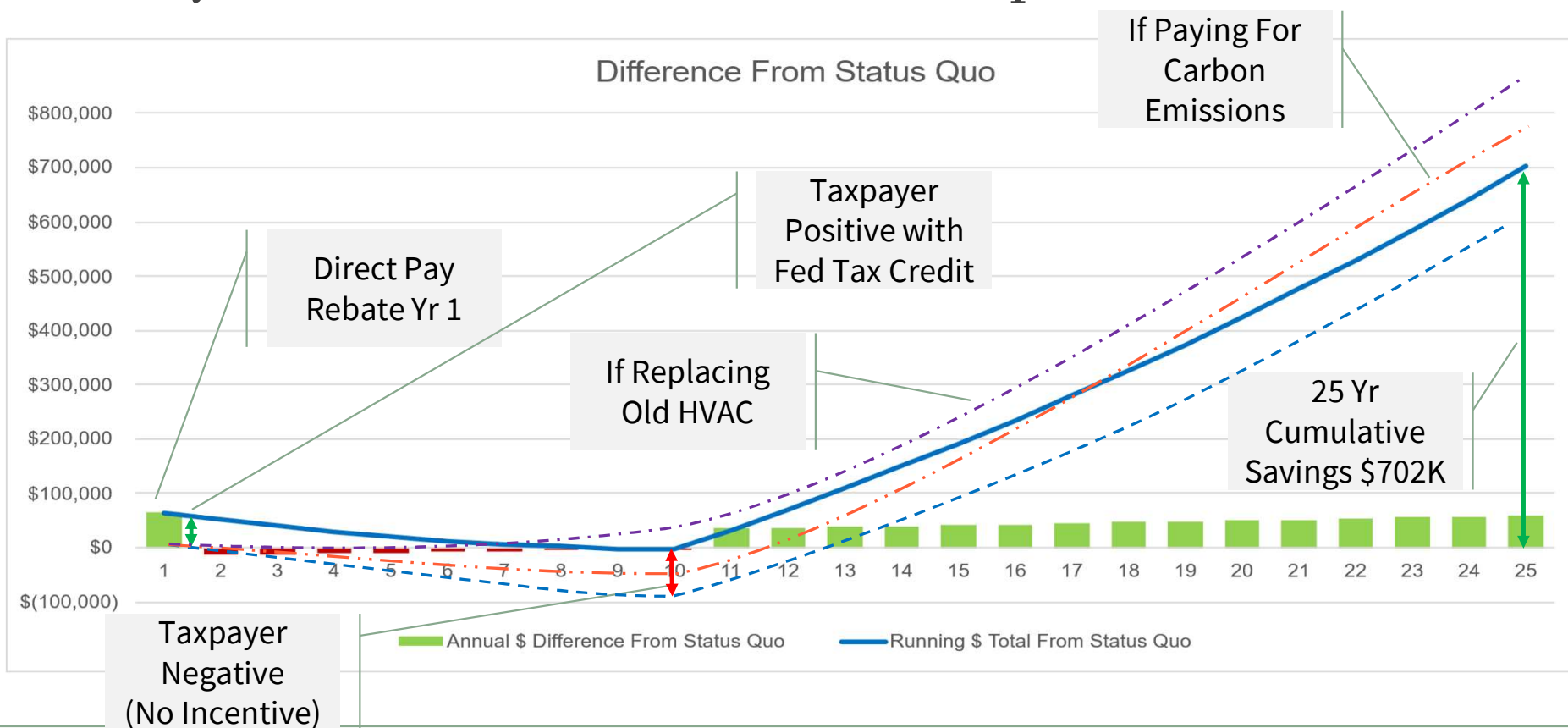


The fiscal approach is sound in both cases.

There's a schedule dependent narrow path to receive the incentives and sustain taxpayer neutrality.

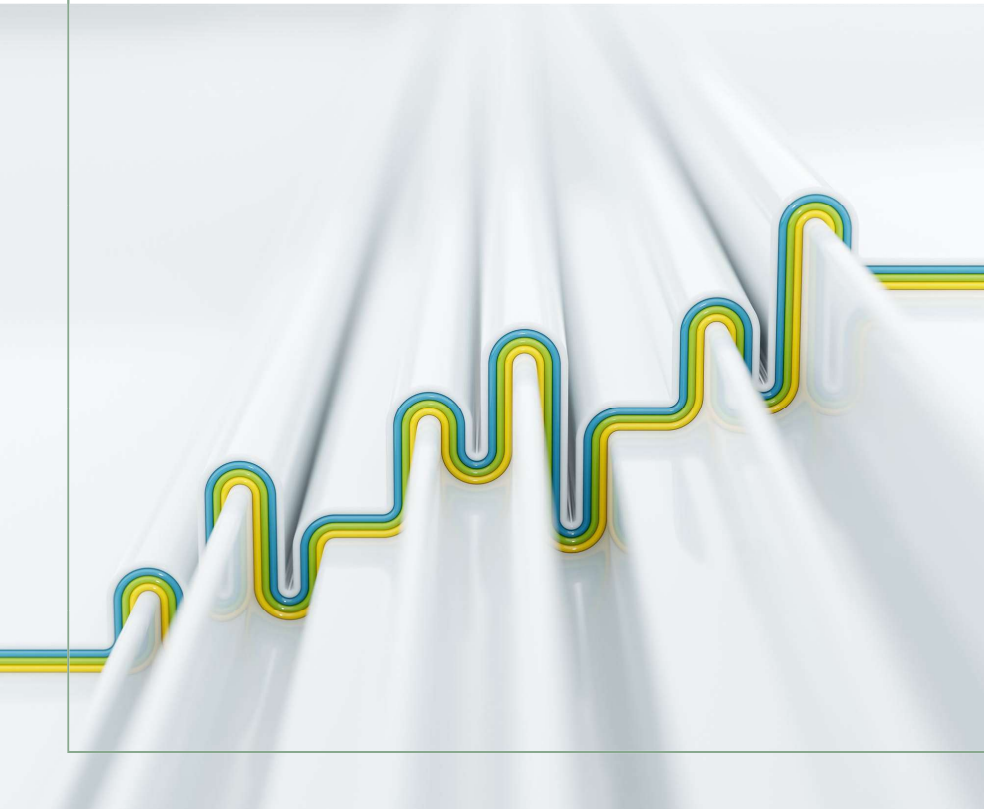
*Old Equipment Replacement Costs Not Factored In. Assumes Electricity (clean fuel) is Coming From Solar

Adding 80 KW Solar Capacity & Overlay Fuel Systems With Efficient Heat Pumps



See CECAC website for best and worst scenarios <https://www.charlotteenergy.org/>

Project Plan



Milestone 1: Analysis

Inventory and Survey the various combinations of solutions and create a financial model based off status quo vs modernized infrastructure approach.

Review with Selectboard



Milestone 2: Request for Proposal(s)

Create RFP(s) for the financially viable solutions. Receive and evaluation technical and financial options

Review with Selectboard & Public Comment



Milestone 3: Implement Project

Go/No-Go/Delay Decision

Release RFB to Vendor & schedule best and final

Secure financing

- Counsel Opinion / Statement Of Necessity
- Apply For Loan Before 11/20 Loan Bond Bank Board Meeting
- Submit IRS Project Registration 12/1?
- Cashflow Safe Harbor Deposit ~12K*

Award Contracts 12/1

Secure & Document Safe Harbor by 12/31

Build and deploy solution by 6/30/2025

Simple Choice:

\$702K 25 Yr
savings

-34,290,000
CO2 Mirror
Balloons Over
Charlotte

Thoughts?
Questions?



Thanks To All Our Volunteers

...And Grant Funded Consultant @ Green Edge Energy Solutions!

Backup & Reference Slides

Risks, Pro's and Con's

Status Quo

- Fuel Price Volatility -
- Electric Price Volatility -
- Fuel Handling & Accidents -
- Equipment Failures -
- Regulation Changes -
- Tariffs -
- Supplier Changes / Shortages -
- Environmental Impacts –
- No effort +
- Little Technical Risk +
- Higher Maintenance Costs -

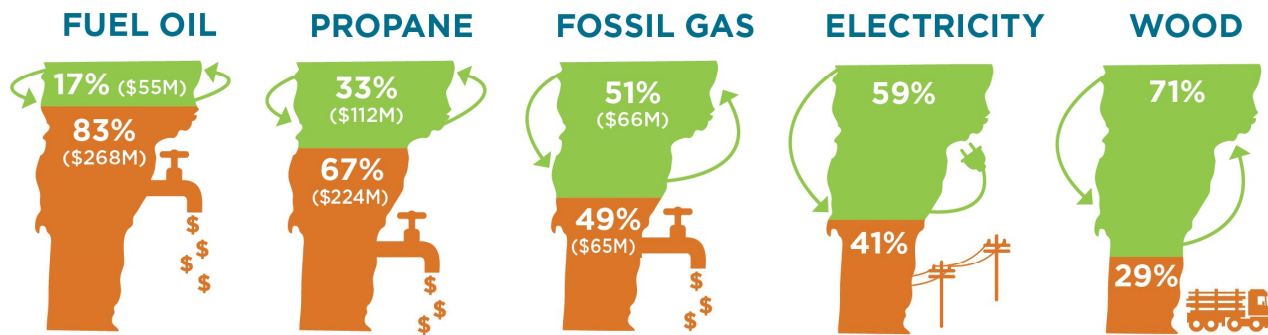
Modernization Proposal

- Eliminate Fuels +
- Stable Fuel Costs For Life Of Systems +
- Isolated From Politics +
- Environmentally Friendly +
- Technical Implementation Risk –
- Financing Timing / Rate Risk -
- Cost Underestimated Risk –
- Property related Risks –
- Grid Provider Rule Change Risk -

Where Energy \$ Goes

Average annual thermal spending in Vermont, 2021-2024

■ Recirculates in the VT economy ■ Leaves the VT economy



Sources: Fossil fuel spending: VT Department of Taxes, 2025; VGS, 2025; EIA, 2025; Electricity spending: VT Department of Public Service and VT electric utilities, 2025; Wood spending: VEIC, "Wood Heat Use in Vermont," 2024; Dollar recirculation share: Ken Jones, EAN Senior Fellow for Economic Analysis, 2025. **Notes:** Kerosene sales are not included in fuel oil total. Total dollars spent on electricity and wood for thermal purposes not available.

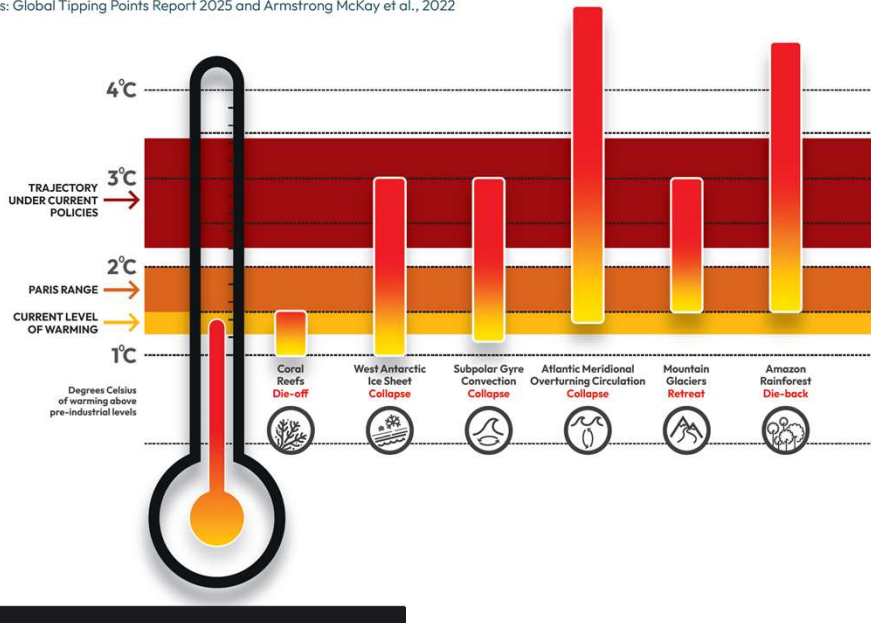


With Solar, just the parts come from elsewhere. Install, service, maintenance and SAVINGS stays local.

How Close Are the Planet's Climate Tipping Points?

Risks of Earth system tipping points increase with global warming

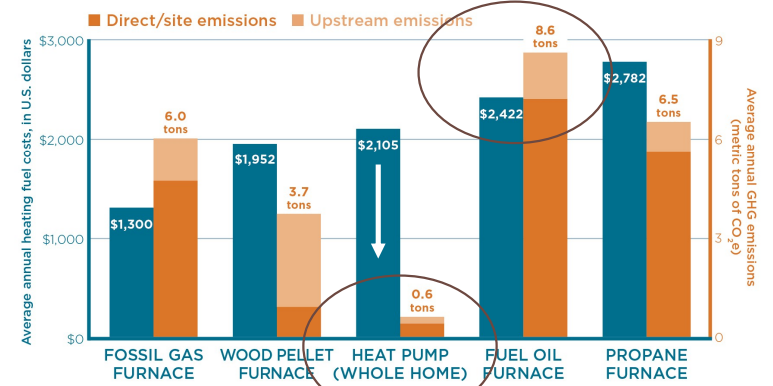
Sources: Global Tipping Points Report 2025 and Armstrong McKay et al., 2022



[Coral collapse signals Earth's first climate tipping point](#)

Earth Imperative

Average annual VT household heating fuel costs and GHG emissions, 2020-2024

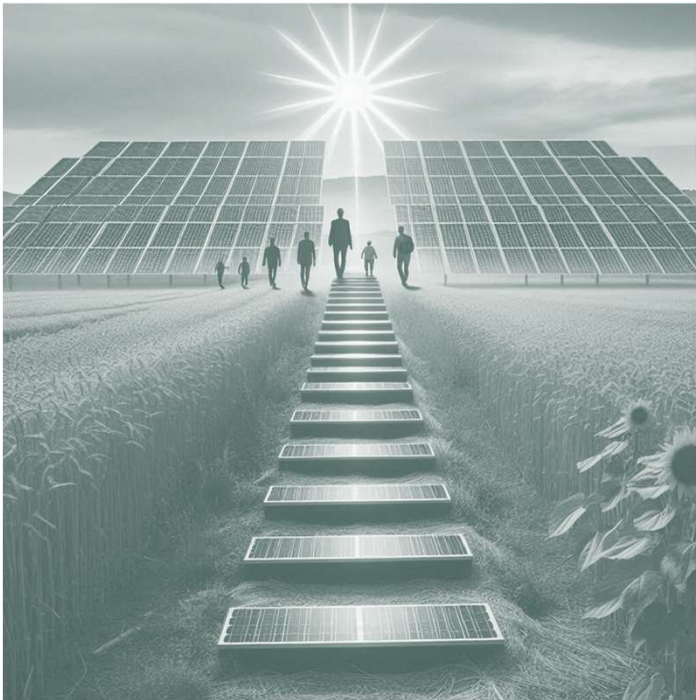


When fiscally viable solutions exist...
What is the downside?

- Path To Meet Town Plan Goals
- Aesthetically Balanced
- Who Benefits From Charlotte Energy Spend
- Regulation & Policy/Timing Constraints
- Bring Economic Clarity To Alternative Energy

A Considered Approach

Project Overview and Objectives



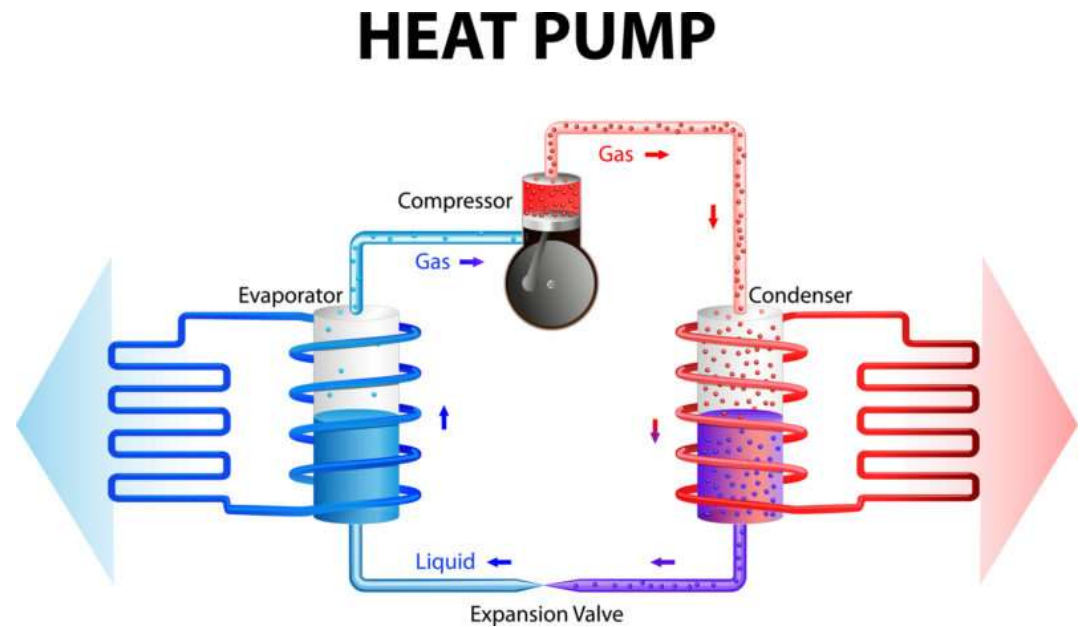
- Reduce Costs
 - Stabilize and lower cost of energy to the Town.
 - Source as much of our own energy as possible.
 - Use savings to upgrade equipment.
 - Take advantage of incentives NOW!
- Transition to Clean Energy
 - More than 80% of voters support the Town transition to sustainable energy usage.
 - Lead VT & encourage other Towns to follow.
 - Improve air quality in town buildings and in town.
- Increase Energy Efficiency
 - Drive energy efficiency through proven technologies and practices to make better use of energy resources.

“How can the Town reduce energy costs while minimizing taxpayer and environmental impact?”

Fiscally Responsible Approach

Heat Pump Concept

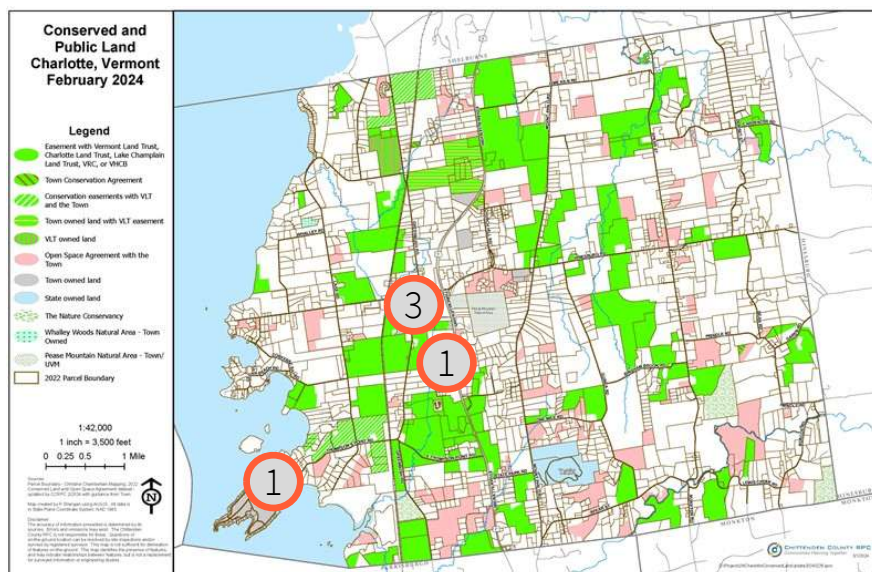
Rather than create heat, heat pumps take the heat from an ambient source, extract it, and send back cooler air or water. The only energy needed is to run the compressor.



Clean, Efficient, Reversible, Simple, Proven

Consider the Views!

Identified 5 Town Properties for Solar Evaluation



Aesthetic & Best Use

Consideration shall be given to visual impact as well as current and future best use of the properties.

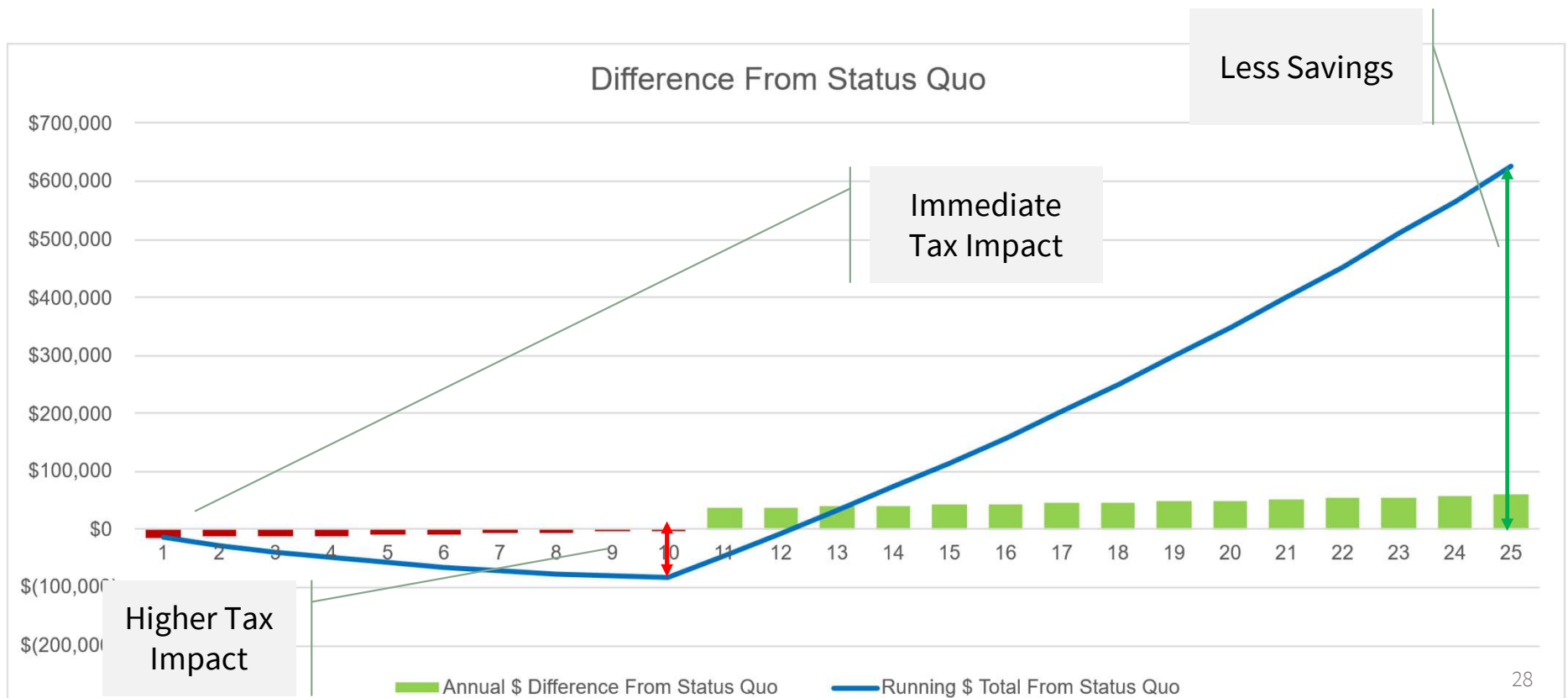
Sun Exposure

Identifying town properties for solar installations requires finding unobstructed space for efficient energy generation.

Access To Grid

To minimize cost and use group net metering, CPG's were filed for 5 of 7 town properties that have access to the grid.

Cost Without Incentives



*Assumes Electricity is Coming From Solar



- Accept Status Quo
- or
- Eliminate ~1000lbs CO2 per Charlotter
- Negligible Short-Term Taxpayer Impact.
- Significant 10-25 Year Taxpayer Savings

*General Approximation based on a population of 3912