



Evergreen Townhomes

Comparison of Natural Gas and Electric utilities and Energy Usage Estimate



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Introduction

Taitem Engineering has prepared this report for the proposed Evergreen Townhomes project located at 1601 Dryden Road Ithaca, NY. The purpose of this study is to compare the upfront and lifecycle costs of a project that uses natural gas and electric with a project that only uses electric. This study has been prepared for the project owner. The proposed project includes 36 townhomes in 6 buildings of 6 townhomes each. The site is previously undeveloped. Details for this analysis were taken from drawings prepared by HOLT Architects dated 1/12/17. Utilities will be provided by NYSEG.

For purposes of this analysis it was assumed that the townhomes meet, but do not exceed, the 2015 International Energy Conservation Code with New York State Supplements.

Scenario #1 - Natural Gas & Electric

This project scenario will use a combination of natural gas and electric to heat, cool, and power the townhomes. The following was used for this analysis:

- A natural gas condensing furnace will provide heating with cooling provided through an evaporative cooling coil in the furnace that is connected to a condensing unit outside. Hot or cold air will be delivered to the rooms through ducted distribution.
- Bathrooms will have an exhaust fan directly ducted to the outdoors.
- Ventilation will be provided through operable windows.
- The range, clothes dryer, and water heater will be natural gas.
- All other appliances and lighting will be electric

Table 1A shows an estimate of the total annual gas and electric usage for the townhouse. The mechanical system installation cost estimate includes the HVAC (heating, ventilation, air conditioning) equipment only. This installation cost can be used to compare initial system costs. Note that the usage attributed to the HVAC system will vary based on solar load and occupant setpoint preference and this is an estimate.

			Natural Gas Usage per year	Natural Gas Cost Monthly Average	Electricity Usage per year	Electricity Cost Monthly Average	Electric & Gas Monthly Average Costs	Mechanical System Installation Cost
Type	System	Program	(therms/year)	(\$/month)	(kWh/year)	(\$/month)	(\$/month)	(\$)
Townhouse	1	3Bed/3Bath	567	\$43	8,255	\$74	\$117	\$13,000

Table 1A – Scenario #1 Annual Energy Usage Estimate

Table 1B shows the assumptions used to generate the usage in Table 1A.

System #1 Assumptions		
Natural Gas Usage Rate	\$0.57	/therm
Natural Gas Customer Charge	\$16.30	/month
Electricity Supply/Delivery	\$0.08	/kWh
Electricity Customer Charge	\$15.92	/month
Natural Gas Condensing Furnace	96.0	% AFUE
Condensing unit	14	SEER
Gas clothes dryer	4	loads/week @ .25 therms/load
Gas range	0.5	hours/day @ .112 therms/hour
Natural gas tank storage water heater	80	% AFUE

Table 1B – Scenario #1 assumptions

Scenario #2 -Electric

This project scenario will only use electric to heat, cool, and power the townhomes. No natural gas will be provided to the site in this scenario. The following was used for this analysis:

- An air source heat pump (variable refrigerant flow) split system with provide heating and cooling. Hot or cold air will be delivered to the rooms through wall mounted fan coils that are connected to an outdoor condensing unit. The rooms will have backup electric baseboard heat that will only turn on when there is an extreme weather event.
- Bathrooms will have an exhaust fan directly ducted to the outdoors.
- Ventilation will be provided through operable windows.
- The range, clothes dryer, and water heater will be electric.
- All other appliances and lighting will be electric

Table 2A shows an estimate of the total annual electric usage for the townhouse. The mechanical system installation cost estimate includes the HVAC equipment only. This installation cost can be used to compare initial system costs. Note that the usage attributed to the HVAC system will vary based on solar load and occupant setpoint preference and this is an estimate.

Type	System	Program	Natural Gas Usage per year (therms/year)	Natural Gas Cost Monthly Average (\$/month)	Electricity Usage per year (kWh/year)	Electricity Cost Monthly Average (\$/month)	Electric & Gas Monthly Average Costs (\$/month)	Mechanical System Installation Cost (\$)
Townhouse	2	3Bed/3Bath	0	\$0	16,701	\$133	\$133	\$22,000

Table 2A – Scenario #2 Annual Energy Usage Estimate

Table 2B shows the assumptions used to generate the usage in table #2A.

System #2 Assumptions		
Electricity Supply/Delivery	\$0.08	/kWh
Electricity Customer Charge	\$15.92	/month
VRF system heating	8.6	HSPF
VRF system cooling	14.4	SEER
Electric clothes dryer	4	loads/week @ 4kWh/load
Electric range	0.5	hours/day @2.3 kWh/hour
Electric tank storage water heater	95	% Energy Factor

Table 2B – Scenario #2 Assumptions

Conclusion

Comparing the upfront costs of the HVAC equipment in scenario #1 and scenario #2, this study shows that the equipment in scenario #2 is almost 70% more expensive than scenario #1; \$22,000 compared to \$13,000. Over the entire project this results in an estimated initial cost difference of \$325,000.

It should be noted that in general, electric appliances, water heaters, and kitchen ranges have a lower purchase price than the equivalent gas versions of these items. This difference in this cost may be in the range of \$500 per townhouse.

It is expected that both the natural gas HVAC system and the electric HVAC system have similar life expectancies, both in the range of 20 years. Comparing the estimated utility costs per month, scenario #2 costs are roughly 13% higher than scenario #1; \$133 compared to \$117.