Fossil Fuel Energy Usage and Comparisons With the Alternative Electric Technology

With Comparative GHG Emissions

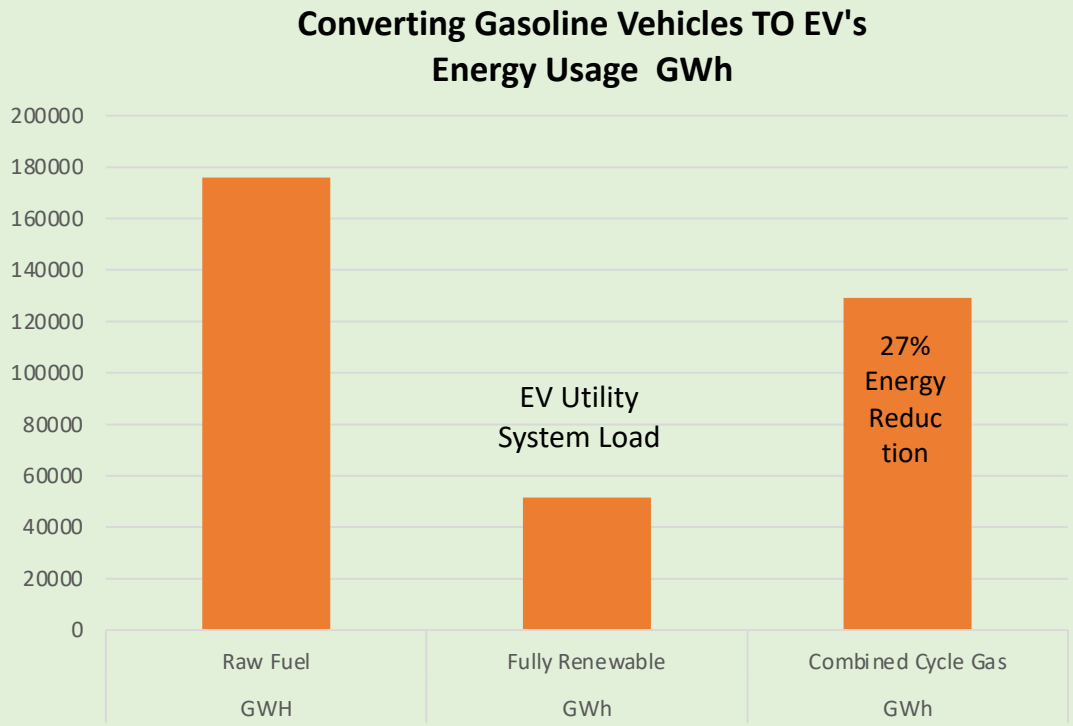
When Resources are Finite, They Need to Be Applied Where Their Value is Maximized

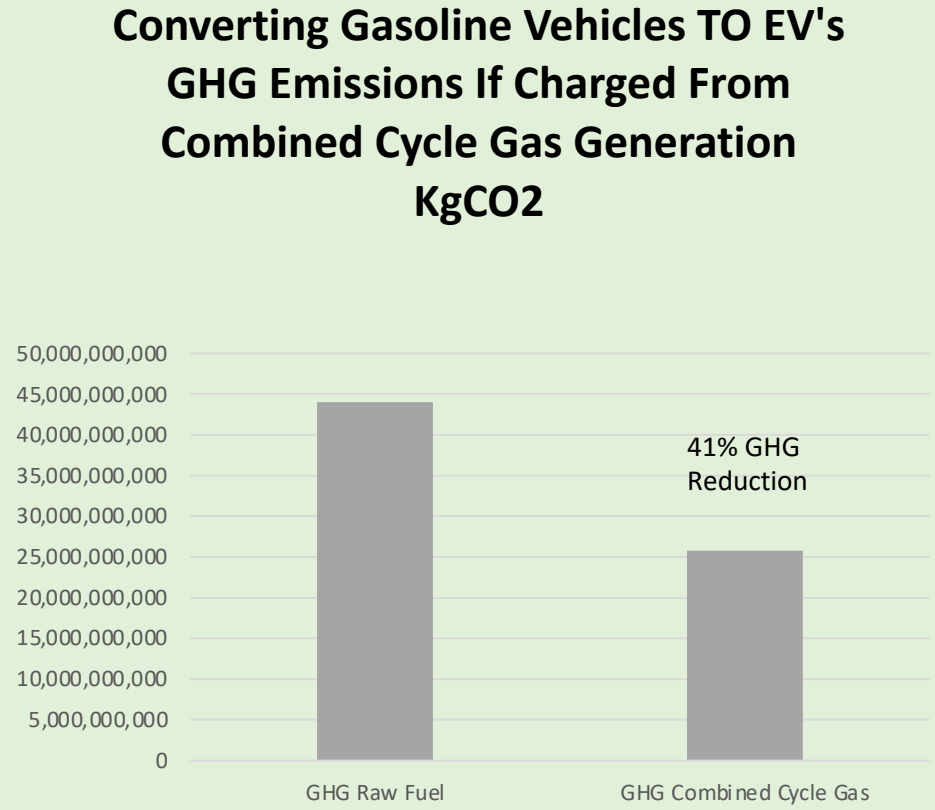
- As will be Demonstrated on the Following Pages, There Will Not be a Sufficient Amount of Renewable Generation to Achieve What NY State is Trying To Do
- If They Achieve Everything On Their Wish List, They Will Still be 33% (100 TWh) Short of What is Needed
- If the Real Goal is Reduction Of GHG Emissions, Then The State is Applying Resources In the Wrong Areas.
- Large GHG Reductions Are Achievable by Combusting Fossil Fuels More Efficiently In Conjunction with Installing Nuclear and Renewable Generation

Converting Internal Combustion Engines to EV's

NY State

CHARGED FROM RENEWABLES OR COMBINED CYCLE UTILITY PLANT GENERATION



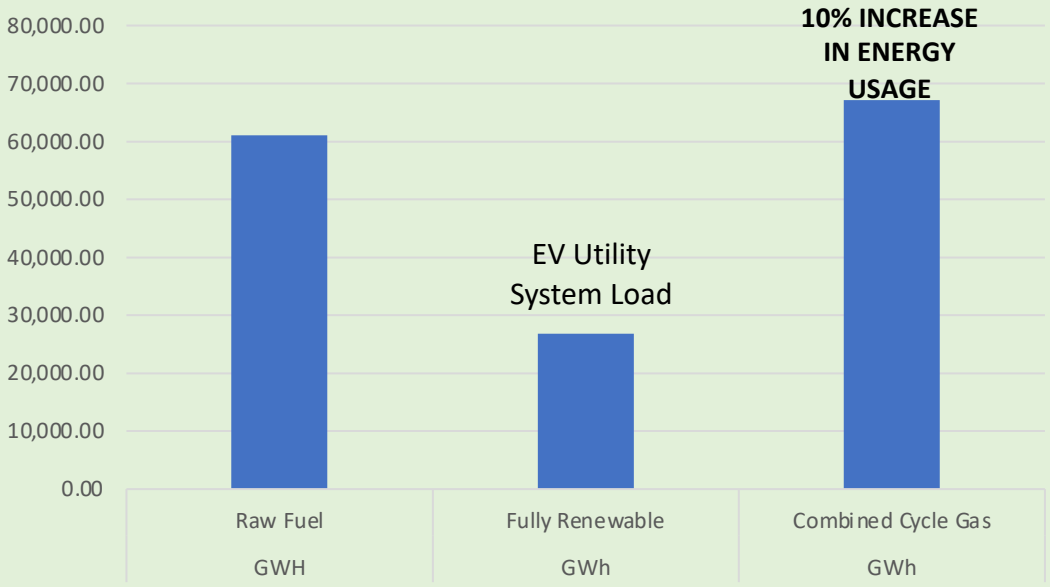


A Minimum GHG Reduction of 41%

Converting Diesel Engines to EV’s

NY State

CHARGED FROM RENEWABLES OR COMBINED CYCLE UTILITY PLANT GENERATION



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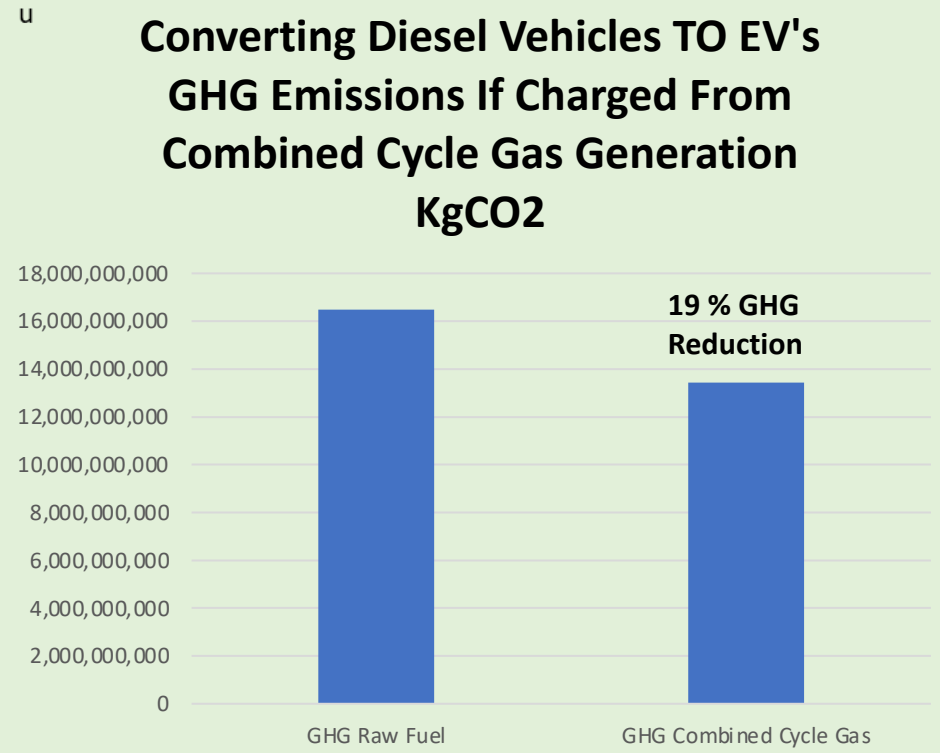
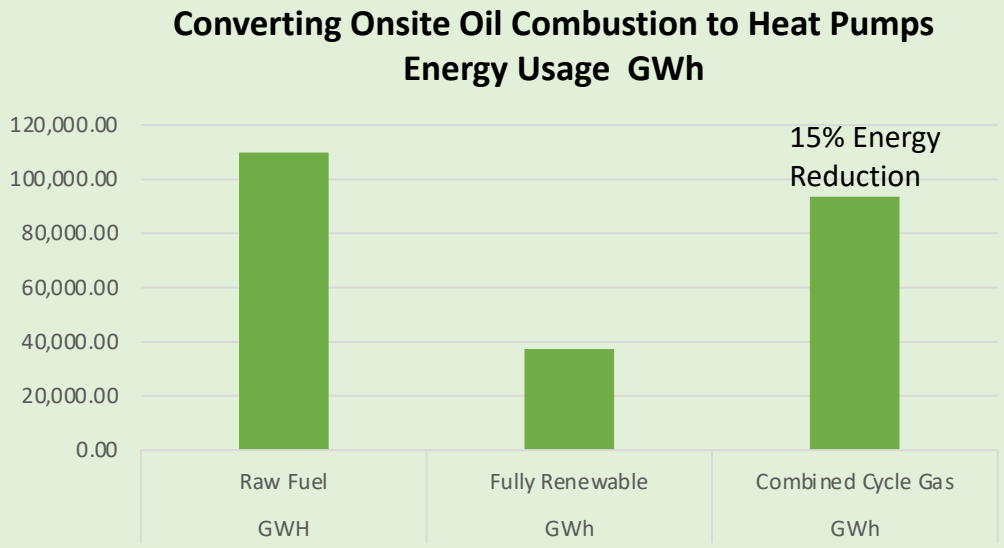


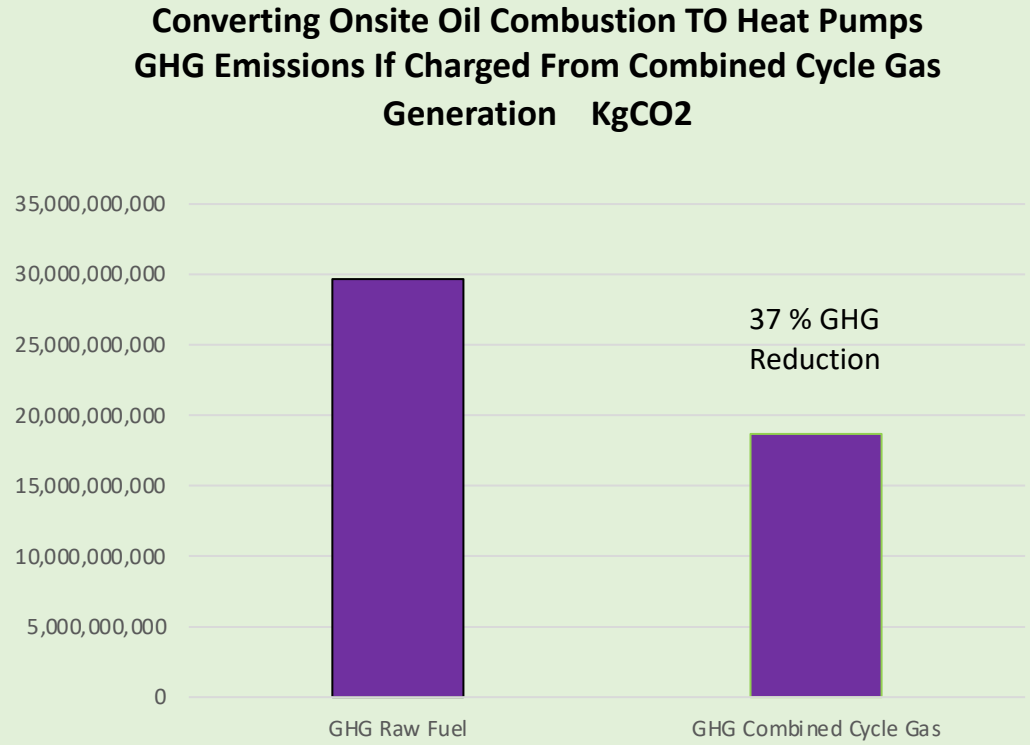
19% GHG Reduction

Converting Onsite Oil Combustion to Heat Pumps

NY State

CHARGED FROM RENEWABLES OR COMBINED CYCLE UTILITY PLANT GENERATION



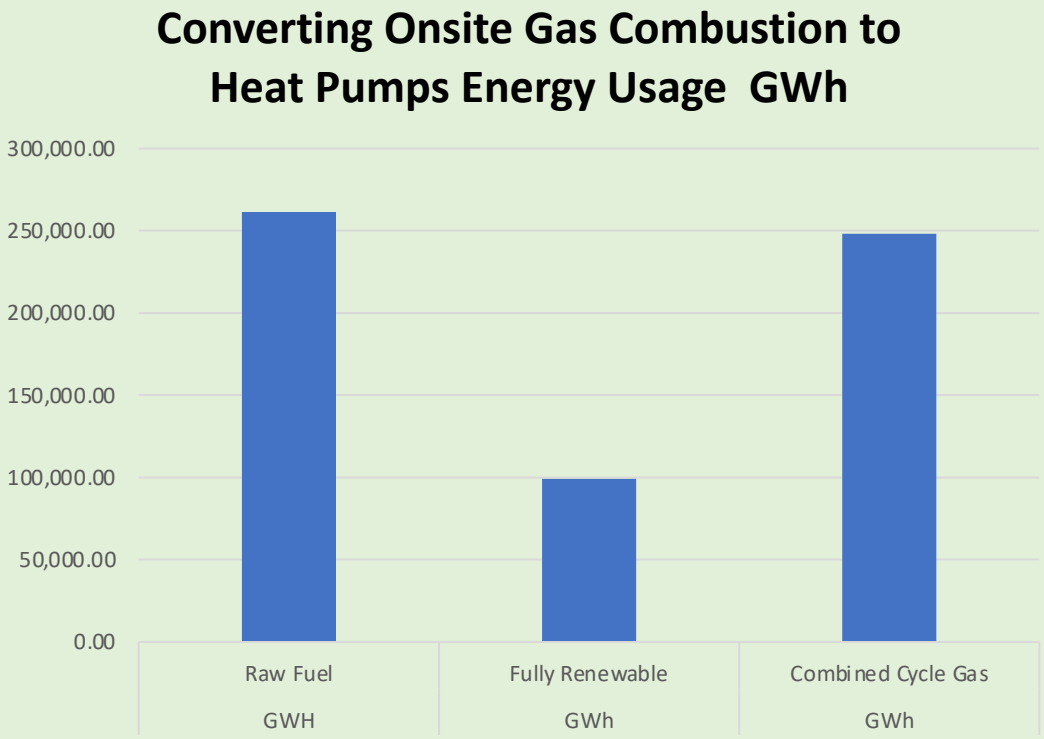


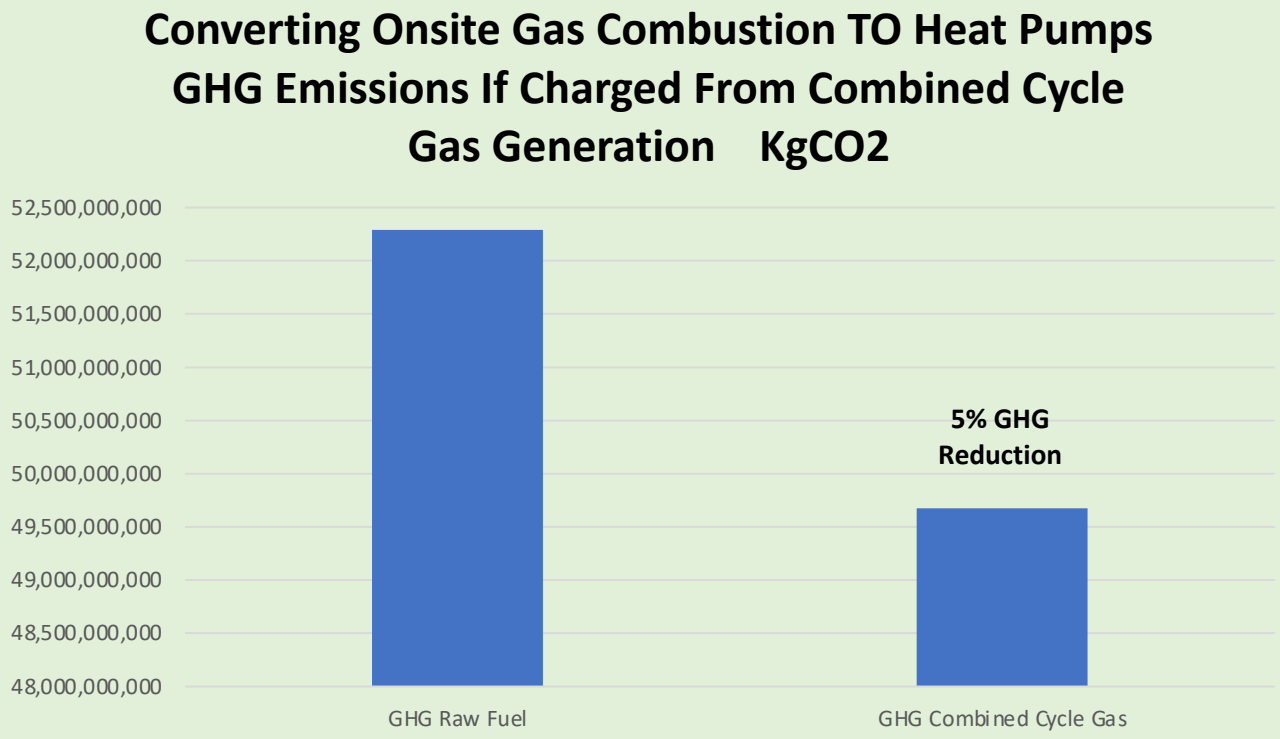
15% Energy Reduction and a 37% GHG Reduction using Heat Pumps Powered by Combined Cycle Utility Generation
Increase of SYSTEM LOAD BY 38,000 GWh

Converting Onsite Natural Gas Combustion to Heat Pumps

NY State

CHARGED FROM RENEWABLES OR COMBINED CYCLE UTILITY PLANT GENERATION





TOTAL RENEWABLE GENERATION UNDER THE STATE'S NEW PLAN IF THEY CAN ACHIEVE ALL OF THEIR GOALS

Renewable Generation	GWh	Capacity Factor CF		
45 GW Solar	47,304.00	0.12		
15.5 GW OSW	62,458.80	0.46		
3.4 GW (Quebec Hydro)	23,827.20	0.8	Reflects Winter Energy Curtailment	
3.0 GW (Quebec Wind)	7,884.00	0.3		
9 Gw Land Based Wind	23,652.00	0.3		
16 GW Bio-Energy	35,040.00	0.25	****	
Nuclear Reduction (1.3 GW)	-10,704.72			
TOTAL GENERATION	189,461.28			
Storage	100		0.0528%	% of Renewable Generation
$28.3 billion			0.0348%	% of Total Load
$283/KWH	LARGE SCALE UTILITY BATTERY COSTS			

**** Experimental Technology and massive infrastructure spending required-Retooling every major Sewage Treatment Plant and Landfill in the state

Generators are approximately 25% Efficient

ASSUMPTIONS TO ACHIEVE THIS LEVEL OF GENERATION

NO NIMBY ISSUES

NO LAWSUITS DELAYING INSTALLATIONS

NO PERMIT ISSUES

NO TECHNICAL ISSUES REGARDING EXPERIMENTAL TECHNOLOGIES, INSTALLATION OF TRANSMISSION, AND GENERATION INFRASTRUCTURE

NO SUPPLY CHAIN ISSUES

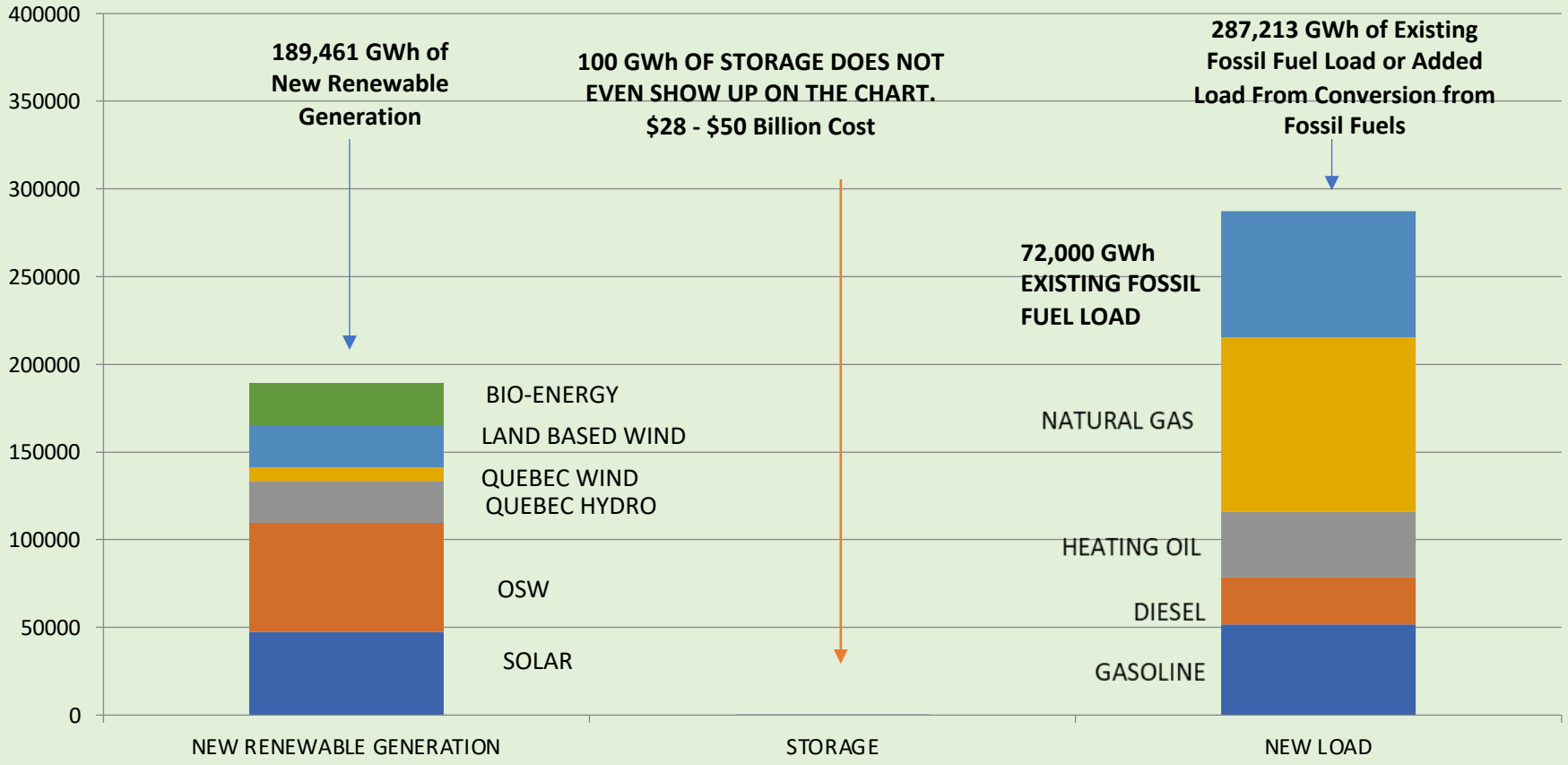
SIMPLY PUT:
NOT REALITY

GENERATION TO LOAD COMPARISON

	GENERATION	STORAGE	LOAD	
	GWh	GWh	GWh	
45 GW Solar	47,304.00			
15.5 GW OSW	62,458.80			
3.4 GW (Quebec Hydro)	23,827.20		51,629.51	Gasoline
3.0 GW (Quebec Wind)	7,884.00		26,864.27	Diesel
9 Gw Land Based Wind	23,652.00		37,366.56	Fuel Oil
16 GW Bio-Energy	35,040.00		99,352.71	Natural Gas
Nuclear Reduction (1.3 GW)	-10,704.72	100	72,000.00	Electric Energy Generation
TOTAL GENERATION	189,461.28		287,213.05	TOTAL ENERGY

NEW RENEWABLE GENERATION vs. PROPOSED NEW UTILITY SYSTEM LOAD

GENERATION SHORTFALL IS AT LEAST 98,000 GWh



EVEN IF THE STARS ALIGN PERFECTLY FOR THE STATE, THEY WILL STILL BE 98,000 GWh SHORT OF THE ENERGY NEEDED TO IMPLEMENT THEIR PLAN

BECAUSE OF THE GENERATION SHORTFALL, ANY ELECTRIFICATION OF FOSSIL FUELS WILL HAVE TO BE SUPPORTED BY NATURAL GAS GENERATION

	KgCO2/KWH REDUCTION	GWH	KgCO2/KWH Reduction Per GWh of Fuel	Ratio KgCO2/KWH Reduction When Compared to Reducing Onsite Gas Combustion
Gasoline	18,187,669,826.67	176,009.71	103,333.33	10.33333333
Diesel	3,052,757,698.16	61,055.15	50,000.00	5
Fuel Oil	10,990,165,131.46	109,901.65	100,000.00	10
Natural Gas	2,614,545,005.20	261,454.50	10,000.00	

THE HIGH RATIOS OF KgCO2/KWH REDUCTIONS WHEN COMPARED TO NATURAL GAS ARE IN PART DUE TO THE HIGHER GAS COMBUSTION EFFICIENCIES AND ARE IN PART DUE TO THE HIGHER TOXICITY OF THE OTHER THREE FUELS

THE ELECTRIFICATION OF CARS, TRUCKS, AND ONSITE OIL COMBUSTION IS

5 to 10.3 TIMES

MORE EFFECTIVE AT REDUCING GHG EMISSIONS THAN ELECTRIFYING ONSITE GAS COMBUSTION

ADDITIONALLY, BY NOT ELECTRIFYING ONSITE GAS COMBUSTION, THERE MAY BE ENOUGH ENERGY AVAILABLE TO KEEP THE SYSTEM OPERATING AS

THE CONVERSION OF GAS COMBUSTION WILL ADD MORE THAN TWICE THE LOAD OF THE OTHER

CONVERSIONS

SPREADSHEETS FOR GRAPHS FOLLOW

NY State Fuel Usage to Used Energy Calculations

	Barrels	Gallons (40 gallons/barrel)	KWH/gallon Gasoline	Total KWh	Total GWh	Combustion Efficiency	Used Energy GWh (Internal Combustion)
Gasoline Sales 2017	130,571,000.00	5,222,840,000.00	33.70	176,009,708,000.00	176,009.71	0.22	38,722.14
Highway Use							
			Diesel				
Diesel Sales		1,500,126,633	40.7	61,055,153,963.10	61,055.15	0.33	20,148.20
							Used Energy GWh
Fuel Oil				109,901,651,314.58	109,901.65	0.85	93,416.40
	MMcf						
Natural Gas	892,120.00		293,071.00	261,454,500,520.00	261,454.50	0.95	248,381.78

Used Energy to Electric Energy Conversions NY State

Used Energy GWh (Internal Combustion)	EV Efficiency Charge/Discharge		Electric Energy (GWh)	
38,722.14	0.75		51,629.51	Gasoline Sales 2017 Highway Use
20,148.20	0.75		26,864.27	Diesel Sales
Used Energy GWh	COP			
93,416.40	2.50		37,366.56	Fuel Oil
248,381.78	2.50		99,352.71	Natural Gas
	1		72,000.00	Electric Energy Generation
		TOTAL ENERGY	287,213.05	

SHOWS TOTAL ELECTRIC LOAD IF ALL FOSSIL FUEL COMBUSTION IS CONVERTED TO OPERATING FROM THE ELECTRIC UTILITY SYSTEM

ELECTRIC ENERGY TO GHG EMISSIONS IF SUPPLIED BY COMBINED CYCLE GAS GENERATION

GHG VALUES OF VARIOUS FUELS ON NEXT SLIDE
SHOWS THE GHG LEVELS OF POWERING THE TECHNOLOGIES WITH COMBINED CYCLE GAS GENERATION AS OPPOSED TO A FULLY RENEWABLE SYSTEM (Kg CO2)

												KgCO2/KWH	
Electric Energy (GWh)					GWh	GWH	GWh	GWh	Combined Cycle	GHG		GHG Raw Fuel	GHG Combined Cycle Gas	Percent
				Efficiency Combined Cycle	Combined Cycle Gas	Raw Fuel	Fully Renewable	Combined Cycle Gas	Percent of Total	Raw Fuel				Combined Cycle vs. Existing Combustion
51,629.51		Gasoline Sales 2017 Highway Use		0.4	129073.786	176,009.71	51,629.51	129073.7859	0.733333333	0.25		44,002,427,000	25,814,757,173.33	58.67%
26,864.27		Diesel Sales		0.4	67160.6694	61,055.15	26,864.27	67160.66936	1.1	0.27		16,484,891,570	13,432,133,871.88	81.48%
37,366.56		Fuel Oil		0.4	93416.4036	109,901.65	37,366.56	93416.40362	0.85	0.27		29,673,445,855	18,683,280,723.48	62.96%
99,352.71		Natural Gas		0.4	248381.775	261,454.50	99,352.71	248381.7755	0.95	0.2		52,290,900,104	49,676,355,098.80	95.00%
72,000.00		Electric Energy Generation												
287,213.05		TOTAL ENERGY												

Specific Carbon Dioxide Emissions of Various Fuels

Fuel	Emissions in kgCO2 / kWh	Emissions in kgCO2 / GJ
Wood *)	**0,39**	**109,6**
Peat	0,38	106,0
Lignite	0,36	101,2
Hard coal	0,34	94,6
Fuel oil	0,28	77,4
Diesel	0,27	74,1
Crude oil	0,26	73,3
Kerosene	0,26	71,5
Gasoline	0,25	69,3
Refinery gas	0,24	66,7
Liquid petroleum gas	0,23	63,1
Natural gas	**0,20**	**56,1**

*) not sustainable used without reforestation

https://www.volker-quaschning.de/datserv/CO2-spez/index_e.php