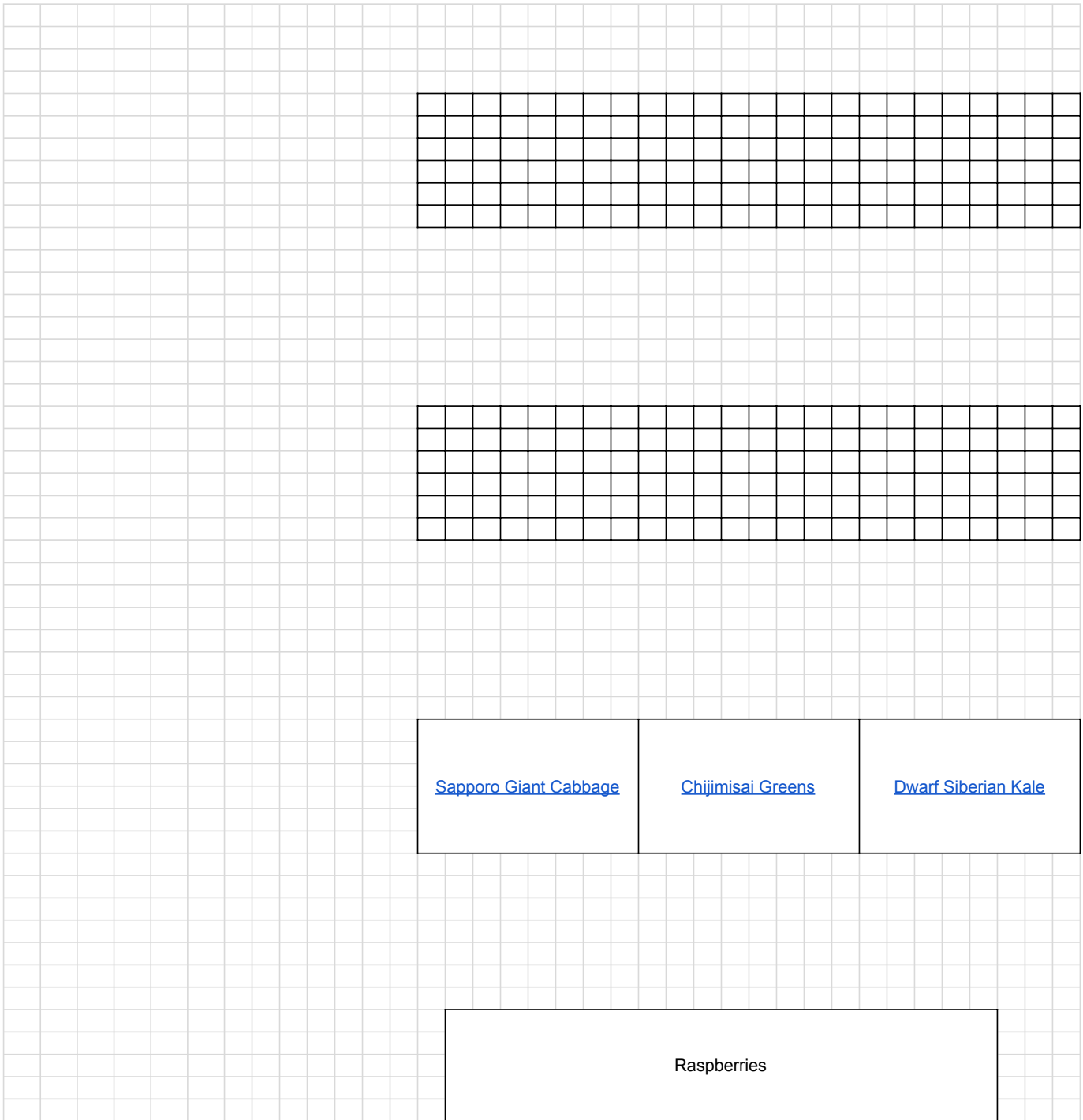


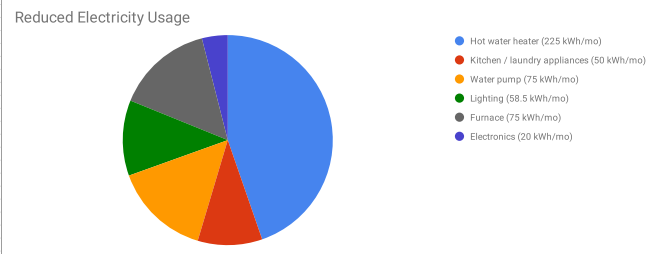
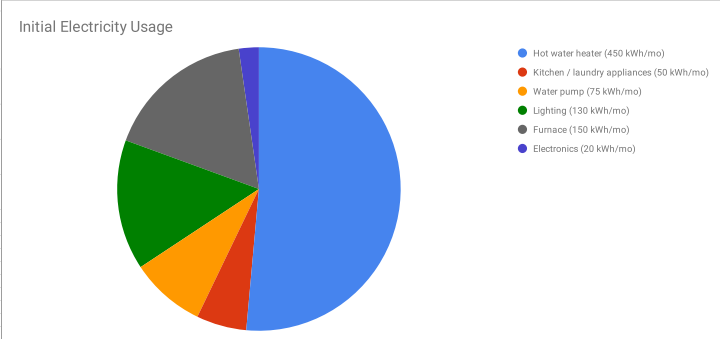
Food	Source	Dry	Can	Freeze	Bottle	Cellar	Year Started	Area	Notes
Honey	Bee hive				x		2006		
Wine	Bee Hive, wild plants, farmers market				x	x	2006		
Olive Oil	Co-op				x	x			Substitute sunflower oil for
Grains	planted crop	x		x					wheat for bread and pasta, barley for beer, oats for breakfast and granola
Beans	garden	x		x			2007	Whole bed	kidney, pinto
Garlic	garden				x	x			Got some hardneck to start with from Dean
Herbs	garden						2007		Keep in kitchen window: scallions, sage, oregano, basil, cilantro, rosemary; Garden: mustard, chamomille, horseradish
Onions	garden					x	2007	Whole bed	
Peppers	garden	x	x	x			2007	1/3 bed, 4 plants	Do not crowd
Pickles	garden		?				2007		
Potatoes	garden					x	2009		
Peas	garden	x		x			2009		Split peas to dry, snap peas to eat
Pumpkins	garden						2007	Compost heap	
Salad Greens	garden						2009		Rotate location to avoid squash bugs
Squash	garden					x	2007	Whole bed with trellis	Need Climbing varieties, rotate to avoid squash bugs
Sweet Potatoes	garden					x			
Tomatoes	garden		x	x			2007	Whole bed	slice tops off and freeze whole, skin on, borrow Logan's pressure canner and tomato machine to make salsa fresca and marinara sauce. Add Calcium when planting. Do not put in pots.
Butter	local farm			x					Byproduct = fresh skim milk? Safety issues?
Cheese	local farm					x	2007		
Meat	local farm			x			2008		pork and beef sides from TICarMik Farm on Route 11
Mushrooms	log	x	?	?			2009		Manion gave us a shitake log, but it needs "filtered sunlight"
Bread	planted crop								
Beer	planted crop				x	x	2007		Needs barley and hops
Sunflower oil	planted crop			?	x				
Sunflower seeds	planted crop	x							
Corn	planted crop	x					2010	Large patch	Including some popcorn. Figure out how to get it from becoming tough and mealy
Apples	Trees		x	x		x	2008		Sauce, apple butter, jam. Some winter varieties stay fresh through december
Cider	Trees			x	x	x			Hard and fresh
Maple Syrup	Trees				x		2007		
Nuts	Trees					x	2008		Filbert (hazelnuts)
Vinegar	Trees (cider)				x	x			Needs starter culture, and separate premises
Berries	wild		x	x			2006		Jam!
Fish	wild			x			2007		Salmon from Ontario
Tea	wild	x					2007		Oswego, spicebush, echinacea, chamomille
tomatillos	garden		x						Salsa verde
cabbage	garden		x						Green for sauerkraut, purple for pickled
Broccoli									
Eggplant									
Sorrel	garden								http://honest-food.net/2012/04/04/french-sorrel-soup/



Sapporo Giant Cabbage	Chijimisai Greens	Dwarf Siberian Kale
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Raspberries

Sources (conventional)		Usage / month	Cost / Unit	Units	Annual Cost	Electricity usage from Nat Grid								
Electricity	National Grid	670	\$0.12	per kW-h	\$965	ReadDate	Days	Total kWh	Delivery Charges	Supply Charges	Total Charges	Avg \$/kWh	Avg kWh/day	
Oil	Ron Bush	80	\$3.30	per gal	\$3,168	11/27/2018	28	1,756	\$126.28	\$73.32	\$199.19	\$0.11	62.7	
Propane	Mill	25	\$0.45	per #	\$135	10/30/2018	29	1,053	\$82.09	\$37.80	\$199.48	\$0.11	36.3	
					\$4,268	10/1/2019	32	803	\$65.26	\$31.63	\$96.48	\$0.12	25.1	
Sources (other than conventional)		Notes	Output		Units	8/30/2019	29	724	\$61.34	\$35.67	\$96.60	\$0.13	25.0	
Heat	Wood	saves ~ 80kW-h / mo blower electricity and 48 gal Oil / mo	60,000		BTU	8/1/2019	31	686	\$60.13	\$26.73	\$86.45	\$0.13	22.1	
Heat	Biodiesel	Not available yet				7/1/2019	31	817	\$67.93	\$26.88	\$94.40	\$0.12	26.4	
Electricity	Stirling Engine generator	feasibility? Has wood backup boiler?	0		kW-h / mo	5/31/2018	31	1,070	\$78.95	\$39.15	\$117.69	\$0.11	34.5	
Electricity	Wind Generator	net metering?	250		kW-h / mo	4/30/2019	32	1,889	\$136.20	\$83.71	\$219.50	\$0.11	62.2	
Light	oil lamp?	air quality?	25		kW-h / mo	3/29/2019	29	2,136	\$135.68	\$65.67	\$200.94	\$0.09	73.7	
Electricity	solar		250		kW-h / mo	2/28/2019	28	2,279	\$141.50	\$88.98	\$230.07	\$0.10	81.4	
Energy Saving Devices		Notes	Savings			1/31/2019	31	2,662	\$157.98	\$127.22	\$284.79	\$0.11	85.9	
Hot Water	electric tankless	Installed 2/12/07	50%			12/31/2018	31	2,313	\$141.41	\$116.04	\$257.04	\$0.11	74.6	
Heat	Programmable thermostat	Installed	10%			11/30/2018	32	1,995	\$124.32	\$89.20	\$213.11	\$0.11	62.3	
Light	fancy bulbs	Installed where feasible	55%			10/29/2018	31	1,035	\$73.23	\$39.39	\$112.21	\$0.11	33.4	
Heat	Add attic insulation, draft proofing		15%			9/28/2018	30	854	\$61.77	\$52.89	\$114.25	\$0.13	28.5	
Heat	Duct insulation		5%			8/29/2018	29	722	\$54.74	\$40.93	\$95.26	\$0.13	24.9	
Heat	Draft reduction	cellar doors	15%			7/31/2018	29	777	\$57.77	\$41.98	\$99.34	\$0.13	26.8	
Propane	Clothesine	Can only use about 1/4 of the year	35%			7/2/2018	31	849	\$64.11	\$41.67	\$105.37	\$0.12	27.4	
Energy Sinks		Notes	Input	Units / mo now	Units / mo saved	Units / mo used	Saved							
Electricity	Hot water heater	Wind power?	450	kW-h	225	225	5/1/2018	33	2,299	\$146.61	\$79.54	\$225.74	\$0.10	69.7
Electricity	Kitchen / laundry appliances		50	kW-h	0	50	3/29/2018	29	2,356	\$155.58	\$64.30	\$219.48	\$0.09	81.2
Electricity	Water pump	Wind power?	75	kW-h	0	75	2/28/2018	28	2,315	\$143.18	\$132.38	\$275.16	\$0.12	82.7
Electricity	Lighting	Wind power?	130	kW-h	72	58	1/31/2018	33	3,290	\$193.03	\$219.61	\$412.24	\$0.13	99.7
Electricity	Furnace		150	kW-h	75	75	12/29/2018	29	2,639	\$166.21	\$127.37	\$293.18	\$0.11	91.0
Electricity	Electronics		20	kW-h	0	20								
			875	subtotal	372	503.5	42%							
Propane	Stove		10	#	0	10								
Propane	Dryer		15	#	5	10								
			25	subtotal	5	20	21%							
Oil	Forced air furnace		80	gal	#REF!	#REF!	#REF!							
			80	subtotal	#REF!	#REF!	#REF!							
Conversions					\$ / MBTU									
Electricity		\$0.12 per kW-h	3412.142 BTU / kW-h		\$35.17									
Oil		\$3.30 per gal	138400 BTU / gallon		\$23.84									
Wood		\$60.00 per face cord	8,333,333 BTU / face cord		\$7.20									
Propane		\$0.45 per #	21591 BTU / #		\$20.84									

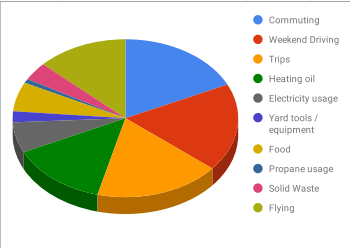


Category	Units / mo used	Units / mo saved	Savings %
Hot water heater	450	225	50%
Kitchen / laundry appliances	50	0	0%
Water pump	75	0	0%
Lighting	130	72	55%
Furnace	150	75	50%
Electronics	20	0	0%
Subtotal	875	372	42%
Propane Stove	10	0	0%
Propane Dryer	15	5	33%
Subtotal	25	5	21%
Oil Forced air furnace	80	#REF!	#REF!
Subtotal	80	#REF!	#REF!

Avg Daily Solar production hours in Tully	4.19	https://www.whc								
Scenario sizing, per day	Demand (kW-hrs)	Production (kW)								
Minimum	22.1	5.3								
Current average	52.9	12.6								
Avg w/o heat and hot water	13.2	3.2								
Maximum	99.7	23.8								
Avg w/ thermal and water heat efficiencies	31.7	7.6								
Assumptions										
Self-install compnents via kit										
Electrician for wiring										
Barn roof mount, existing 60A service line [1]										
Size	6	kW								
Fed tax incentive	30% credit									
NYS tax incentive	25% credit									
NYSERDA incentive	loan									
Nat Grid incentive	nothing									
Construction Cost Estimate	Rental/day	Equipment days	Cost	\$/hr	Labor hrs	Cost	Unit Cost	Material Units	Cost	Total Cost
Inverter and controls	\$0	0	\$0	\$125	8	\$1,000	\$400	6	\$2,400	\$3,400
Panel mounts	\$0	0	\$0	\$0	20	\$0	\$100	18	\$1,846	\$1,846
Panels	\$0	0	\$0	\$0	0	\$0	\$1,000	6.00	\$6,000	\$6,000
										\$11,246
Return on Investment	Cost	Cost per kW	Payback (yrs)							
Out of pocket	\$11,246	\$1,874	10.7							
With tax incentives	\$5,061	\$843	4.8							

Source	Solution 1	Solution 2	Solution 3	Solution 4	Notes
Manure	Compost				Takes 2 years?
Stormwater	cistern collector	Rain gardens			Roof and driveway runoff, several gradens
Ashes	Compost				
Kitchen Waste	Compost	Vermicompost			
Cardboard	Incinerate	Recycle			
Papers	Get on "do-not-send" lists	email bills	incinerate	recycle	
grocery bags	reusable cloth bags	recycle			
Computers	recycle				
Meat packaging	butcher paper	shrink wrap			

Sources	Amount (kg CO2/yr)	Amount	Comments	Mitigation Measures	Mitigation amount	Reduction	Remaining	Conversions
Commuting	7,600	800	2400 gallons gas	Ride share, electric car, bus	75%	5,700	1,900	1 gallon gas = 9.5 kg CO2
Weekend Driving	7,600	800		Less frequent puppy K, visits to friends	75%	5,700	1,900	1 gallon oil = 9.8 kg CO2
Trips	7,600	800		Change to more local venues	75%	5,700	1,900	2485 miles by plane = 570 kg CO2
Heating oil	5,880	600	Using only oil heat uses 600 gallons / yr	See Energy usage sheet	80%	4,704	1,176	1 kWh (from gas) = 0.4 kg CO2
Electricity usage	2,640	6600	6600 kWh	See Energy usage sheet, wind energy	75%	1,980	660	1 gallon propane = 5.9 kg CO2
Yard tools / equipment	950	100	100 gallons gas			0	950	1 lb beef = 1.1 kg CH4
Purchased goods			Almost totally unquantifiable	Purchase less stuff	15%	0	0	1 lb beef = 25.3 kg CO2
Food	2,530	100	Miles" calculator	Grow our own, see Food sheet	75%	1,898	633	1 lb recyclables = 0.1 kg CO2
Propane usage	354	60	300 lbs gas	See Energy usage sheet	35%	124	230	1 large bag garbage = 20 kg CO2
Solid Waste	1,575	75	includes production of and disposal of, and recyclables	See Waste sheet	45%	709	866	
Flying	5,505	24000	8 roundtrips	Telecommuting, buy per-trip offsets	100%	5,505	0	
						76%	24%	Original
		42,234				32,019	10,215	42,234
								Cost in offsets per year
						\$315	\$101	\$416
Sinks								
Tree growth			Net neutral in northern latitudes?					
grass growth			Convert to animal metabolism?					
wood building materials			Not sustainable on per-family basis					
Compost Management plan			Stored as organic carbon in humus (but methane production must be reduced)					
Biochar			Available at small scale?					
Neutral or unknown								
Burning wood			Transportation of firewood?					
Carbon Offset firms								
TerraPass		\$10 per ton						



Pest	Type	Method 1	Method 2	Method 3	Method 4	Link
Slugs and snails	<i>Insect</i>	High-tannin diet?	Ducks			https://projects.sare.org/project-reports/fnc
Carpenter Bees	<i>Insect</i>	Traps	Pyrethrum-based exterior spray			
Cluster Flies	<i>Insect</i>	Seal voids	Window traps	Pyrethrum-based exterior spray	UV light	
House flies	<i>Insect</i>	Seal voids	Pyrethrum-based exterior spray		UV light	
Lady Bugs	<i>Insect</i>	Seal voids	Pyrethrum-based exterior spray		UV light	
Mosquitoes	<i>Insect</i>	Swallow boxes	Pyrethrum-based exterior spray			
Stinkbugs	<i>Insect</i>	Seal voids	Pyrethrum-based exterior spray			
Wasps	<i>Insect</i>	Fake nests				
Honeysuckle bush	<i>Plant</i>	Goats	Pull			
Milkweed	<i>Plant</i>	Pull				
Swallow Wart	<i>Plant</i>	Pull				
Mice	<i>Rodent</i>	Cat				
Voles	<i>Rodent</i>	Cat				
						http://nysipm.cornell.edu/
						http://www.bugclinic.com/products.htm

[1] Mounting on the barn and reusing barn electrical service saves a lot