Appendix B: Measures and Benefits Analysis

Simplified CCAP GHG Benefits Model

V5. August 2025

Location: Genesee Finger Lakes

A model to estimate the benefits measures developed for the Genesee Finger Lakes Regional Comprehensive Climate Action Plan funded by the EPA Climate Pollution Reduction Grant (CPRG) Program.

Model Contents - Spreadsheet Tabs

- Light blue tab - 2022 Regional Baseline GHG Inventories. - computed elsewhere.
- Purple tabs - CCAP Projections and Measures Analysis.
- Grey tabs - Resources model resources (emission factors, census tracts, reduction ratios, etc)

Approach to creating CCAP sector measures through stakeholder engagement

1. In each sector, identify primary human activities that create GHG emissions.
2. Develop a set of high-level sector measures that address these activities. Measures represent thematic groups of projects, policies, and programs to be implemented regional stakeholders. These measures will also support projects being proposed to the CPRG grant program by eligible applicants.
3. Sector measures, although high level, are designed to avoid duplication where possible.

Quantify GHG Benefits of Sector Measures

1. Identify the GHG emissions from the baseline inventory spreadhseet impacted by the measure.
2. Narrow the amounf if the meassure is focued on only a portion of that amout and document assumptions.
3. Calculate emission reductions for 2035 by deflecting underlying activities, document assumptions.
4. Calculate emission reductions for 2050 by deflecting underlying activities, document assumptions.
5. Calculate GHG Benefits as a straight reduction of fossil fuel use, or by using Emission Reduction Ratios (ERRs) for the conversion of fossil fuels to electricy or alternative fuels. See tabs herein for more details on ERRs

<u>Example Deflection Pathways</u>

- Electrification (e.g., Heat pumps)
- Alternative fuels and vehicles (BEVs, hydrogen, RNG, etc.)
- Reducing activity (demand reduction) - efficient community design, codes, weatherization, VMT reduction, etc.
- Reducing waste, diversion, etc.
- Installing renewables - calculated as a demand reduction of electricity.
- Living in compact development patterns vs suburban and rural patterns.

Sinmplified Business as Usual Approuch - Focus on Local Action.

This simplified model calcualtes benefits against a BAU that grows with population, and does not include the impacts of state and federal policies. Fuel economy standards represented at a state level. The available for clean energy on the grid is state policy. The CCAP Projection tab illustrates the additional benefits of state and federal action seperate from local action.

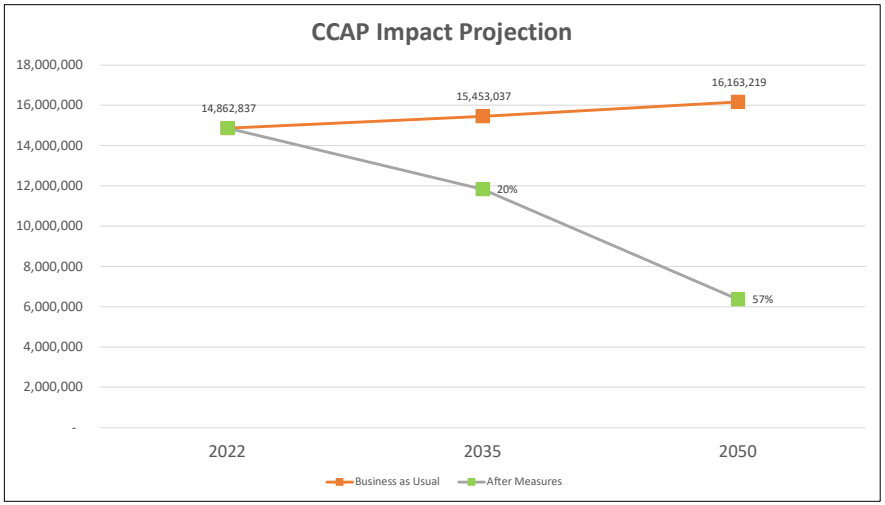
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Definitions

Business as Usual: Emissions growth with population based on 2022 emissions assuming no change in technologies.

After Measures: Projected emissions as a result of implementing proposed measures at the rates adopted in the plan. CCAP Measures project impacts in changes based on local action, and do not change electricty energy mix, or mix vehicles in the market. There will be still be fossil fuels used in transportation and buildings.

Net Zero Scorecard: Illustrative to show potential to reach state's goal, and shows that it is dependeent on state policy objectives being met for

Select	2035 - Ambitious
Population Growth (annual)	0.30%

Year	Business as Usual	After Measures	Reduction from 2022
2010	16,118,984	16,118,984	
2022	14,862,837	14,862,837	
2035	15,453,037	11,826,324	20%
2050	16,163,219	6,365,185	57%

Net Zero Scorecard	**80 by 20250**		
Emissions			
Local Action		6,365,185	57%
State Policies			
Zero Emission Electricty		800,000	
ZEV Mandate for Passenger Vehicles		1,600,000	
Fossil Fuel Free Buildings		1,250,000	
Total		2,715,185	82%
Additional sequestration needed			
Land Use		3,000,000	20%
Net Emissions		**0**	**100%**

Measures Summary		Savings by 2035		Savings by 2050	
	Number of Measures	Conservative	Ambitious	Additional	Total
A. Transportation	5	251,625	503,251	1,099,059	1,602,309
B. Buildings and I	4	924,953	1,849,906	2,672,456	4,522,361
C. Electric Power	2	55,415	110,831	258,454	369,285
D. Agriculture an	5	107,049	214,099	428,197	642,296
E. Materials Man	2	98,345	196,690	716,292	912,981
F. Industry and W	1	136,284	272,568	545,136	817,704
Total	19	1,518,257	3,036,513	5,461,140	8,497,653

Emissions by Sec	**Business As Usual**				**By 2035**		**By 2050**
	2010	2022	2035	2050	Conservative	Ambitious	Total
Transportation	5,939,414	5,770,327	5,999,466	6,275,186	5,518,702	5,267,077	4,168,018
Built Environmen	8,504,167	6,649,566	6,913,619	7,231,351	5,588,329	4,527,092	1,309,500
Energy Generatio	-	-	-	-	(55,415)	(110,831)	(369,285)
Industrial Proces	37,292	-	-	-	-	-	-
Refrigerant Use	278,673	279,981	291,099	304,477	279,981	279,981	279,981
Waste	446,347	779,968	810,941	848,210	681,624	583,279	(133,013)
Agriculture	913,091	1,382,994	1,437,913	1,503,996	1,275,945	1,168,896	740,698
Total	16,118,984	14,862,837	15,453,037	16,163,219	13,344,581	11,826,324	6,365,185

					Local Reduction (2035)				+	State and Federal Support (2050)			Total Reduction	
				0.5	*Foundational efforts - Includes tools and regional capacity building + awareness of state and fed tools*			*Justification - Why and how this will work*	+	*Additional - Funding and programming (CLCPA)*		*Justification - Why and how this will work*	*80%*	
Type	**A. Transportation and Land Use**	**Association to Baseline Emissions**	**Discount**	**Baseline**	**Conservative (10% Reduction)**	**Ambitious (20%) reduction**	**Ambitious**	**Focus on high reductions in dense urban centers, and slow transition in rural counties**	+					
A. Transportation and Land Use	1. Invest in zero or near zero emission passenger vehicles	Assume all passenger vehicles go to electric. Apply to all passenger vehicle VMT.	Measure A.5	2,185,210	154,152	308,303	20%	Based on current rebates, culture around Evs, and	+	60%	924,910		80%	1,233,213
A. Transportation and Land Use	2. Invest in near zero emission public transit vehicles	Assume transit vehicles go to hydrogen and electric. Assume 1% of rural arterials and 2% diesel VMT is transit		55,682	11,136	22,273	40%	Work with regional transit partners to replace current fleet when it makes sense with current funding	+	40%	22,273		80%	44,545
A. Transportation and Land Use	3. Invest in near zero emission school bus fleet	Assume school buses go electric per state mandate. Assume half of state reported bus VMT is school buses. Assume they are all diesel		37,015	2,248	4,495	20%	Target dense population areas for Evs, eventually with technology improvements we see more adoption in rural areas	+	70%	15,734	current state mandate	90%	20,229
A. Transportation and Land Use	4. Invest in near zero emission medium and heavy duty trucks	Apply only to VMT on Rural interstate and all urban road, and only to VMT that is single and combination trucks		111,842	7,341	14,681	20%	Target dense populations for air qual and env. Justice freight distribution in urban areas and long range trucking	+	60%	44,043		80%	58,725
A. Transportation and Land Use	5. Implement strategies to reduce single-occupancy vehicle trips and VMT	Apply only to VMT for passenger vehicles that are considered single oppupancy estimated to be 40% of passenger vehicle VMT based on 2009 USDOT study.		2,338,709	76,749	153,498	25%	Work with transit partners and advocacy groups to center urban desnsity and rural centers	+	15%	92,099	state and federal funding for local p	40%	245,597
	B. Buildings and Infrastructure								+					
B. Buildings and Infrastructure	1. Transition to air-source and ground sourced heat pumps and heat pump water heaters in all buildings	Apply to natural gas, oil, and propane used in residential, commercial, and indiustrial sectors. Assume 70% of energy is for heating and cooling in residential and commercial sectors, and 30% in industrial sectors.	Measure B.2 and Measure B.3	2,343,102	413,935	827,869	45%	with current education and outreach, local policy, and ability for households to adopt this technology, turnover of technology naturally to reduce energy costs	+	45%	827,869	current rebates and policy requirem	90%	1,655,739
B. Buildings and Infrastructure	2.Measure: Increase energy efficiency in all buildings (including pre-weatherization and weatherizatio)	Apply to electricity, natural gas, oil, and propane used in residential, commercial, and indiustrial sectors. Assume 70% of energy is for heating and cooling in residential and commercial sectors, and 30% in industrial sectors.	Measures D.5 and Measure F.1	3,872,097	290,407	580,815	15%		+	30%	1,161,629		45%	1,742,444
B. Buildings and Infrastructure	3.Measure: Adopt Zero-Emission Codes and Standards for all buildings	Apply to new construction and gut rehabs. Assume 10% of stock will turnover as new or gut rehabs by 2035. Zero emissions in existsing buildings covered in Measure 1 and 2		3,165,652	120,867	241,735	10%		+	20%	483,470		30%	725,205
B. Buildings and Infrastructure	4. Reduce embodied carbon (the greenhouse gas emissions that occur when building materials are produced, transported, and used) from all buildings	Apply to upstream, embodied, emissions from materials consumption. Research suggests 37% of global energy emissions are related to production and use of building materials (see report). We assume 37% of energy-related emissions are theoretically avaible to reduce with LCA efforts.		6,649,566	99,743	199,487	3%	sourcing local material, recycling building material, low carbon cement,	+	3%	199,487		6%	398,974
	C. Electric Power and Energy				*increase % of local cover*	*rease % of local coverage*			+	*ease % of local coverage*				
C. Electric Power and Energy	1. Increase large-scale renewable energy generation to supply clean electricity to the region, in appropriate areas	Apply to electricity-related emissions in the residential, commerical, and industrial sectors.		1,226,437	6,132	12,264	1%	based on the fact there are already large scale systems that are not benefitting the region, there is a small local benefit	+	5%	61,322	public service commission requires municipal benefit for host community, larger local benefit , state supported policy	6%	73,586
C. Electric Power and Energy	2. Increase the adoption of small and medium scale renewables (like rooftop and parking lot solar installations), with an emphasis on commercial land in NYS DAC communities and communities with environmental risks	Apply to electricity-related emissions in the residential and commerical. Note, does not modify the electricity emission factor used for measures analysis elsewhere. This was done to enable reporting this as a separate measure.		985,663	49,283	98,566	10%	community based renewables and microgrids that directly benefit communities	+	20%	197,133		30%	295,699
	D. Agriculture and Working Lands													
D. Agriculture and Working Lands	1. Reduce carbon emissions through regional sustainable forest and land use management practices and reforestation	*carbon sequestration*						offset of emissions	-					
D. Agriculture and Working Lands	2. Increase carbon storage in soils through biochar production from slash and thinning biomass	*carbon sequestration*						offset of emissions	-					
D. Agriculture and Working Lands	3. Decrease methane emissions	Apply to all Ag methane emissions, which are primarily from livestock related operations. This assumes reductiosn from both enteric fermentation and manure.		1,382,994	103,725	207,449	15%	livestock operations, covering methane ponds,	+	30%	414,898	state policy to require methane pond coverage and capture, management of ag lands, funding to support	45%	622,347
D. Agriculture and Working Lands	4. Decrease fertilizer use	Apply to all fertilizer related emissions, primarily N2O from nitrogren fertilizer.		-	-	-	15%	cover crops, best fetiziler technology and practices		30%	-	state funding to support education outreach and movement to new technologies	45%	-
D. Agriculture and Working Lands	5. Increase energy efficiency through sustainable agricultural practices and use clean energy	Apply to esitmated energy used in the agriculture sector. Assume 2% of total energy is from agricultural energy use- both fro operations and equipment.		132,991	3,325	6,650	5%	operational improvements through education and outreach, local collaboration, increase technology		10%	13,299	state funding to support education outreach and movement to new technologies	15%	19,949
	E. Materials Management													
E. Materials Management	1. Increase Landfill Diversion	Apply to all Scope 3 solid waste emissions, and assume a straight reduction.		659,405	65,941	131,881	20%	We know per capita has gone up, NYS has a lot of exisiting incentives, programs, and policies to support this work		30%	197,822	increases in funding and policies, increase support for landfills, aneraobic digestion, funded mandates, cleaning the food supply	50%	329,703
E. Materials Management	2. Encourage landfills and wastewater treatment facilities to use the latest technology of methane capture for active and closed landfills	Apply to all Scope 3 solid waste and wastewater emissions	Measure E.1	648,087	32,404	64,809	10%	baseline is 75% methane capture by EPA, captures an additional amount		80%	518,470	increase to 90%	90%	583,279
	F. Industry and Workforce													
F. Industry and Workforce	1. Decarbonize and retrofit industrial processes by adopting zero emission technologies, improving energy efficiency, and transitioning to carbon-free and renewable energy sources	Apply to all industrial sector energy and process emissions		1,817,121	136,284	272,568	15%	exisiting building improvement for heating and cooling needs, low hanging fruit, slow to change without innovative technology		30%	545,136	movement from different energy sources, technologocal improvments, funding for research and innovation	45%	817,704
						3,147,344								