New York State Climate Action Council

Agriculture and Forestry Advisory Panel

March 16th, 2021

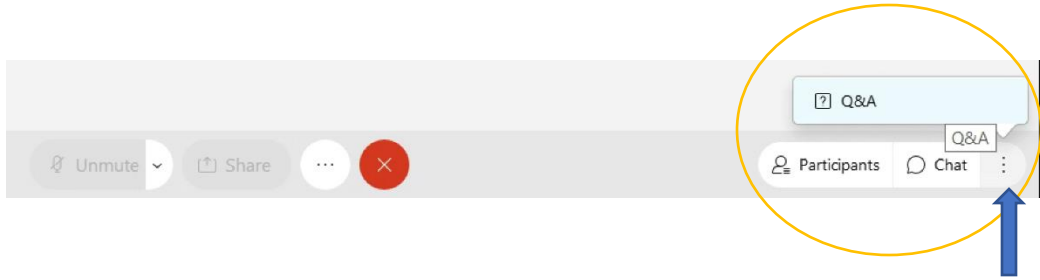
Meeting 10

NEW YORK STATE OF OPPORTUNITY. | Climate Action Council

Procedure for Public Input

The Advisory Panel welcomes public comments and questions both during and in between its meetings

> To submit feedback to Panel Members and agency staff during the meeting, members of the public can use the WebEx Chat function located in the right bottom corner.
  - Comments and questions submitted through WebEx will be aggregated and submitted to panel members to be included in deliberations.



> To submit feedback between Advisory Panel meetings, please email agriculture.forestry@agriculture.ny.gov

Agenda

- Welcome
- Roll Call
- Bioeconomy, Avoided Conversion, Forest Management Recommendation Template – DEC Staff
- Aggregated Emission Reduction/Sequestration Estimate
- Next Steps

Agriculture and Forestry Panel: Subgroups and Strategies

Bioeconomy:

> Support opportunities to substitute fossil fuels

> Expand Markets for Harvested Wood Products

Land Conversions:

> Keeping forests as forests

> Agricultural Protection and Access

Forestry:

> Urban Forestry

> Statewide Afforestation/Reforestation Efforts

> Improved Forest Management

Bioeconomy Recommendations

Enabling strategy summary - Bioeconomy

Initiative #	Description	Action type	Ease of implementation	Cost
	Expand Markets for Sustainably Harvested Long-Lived Wood Products	Market development, Research	Medium	$$
	Sustainable biomass feedstock action plan for 2050 hard-to-decarbonize products	Research and Planning	Medium	$
	Increasing market access for NY low-carbon products	Market development; Research	Hard	$$
	Financial and Technical Assistance for Low-Carbon Product Development	Technical support, financial incentives	Easy/Medium	$$
	Bio-based Products Research Development & Demonstration Overview	Research initiative, pilots	Medium	$
	Net Negative Carbon Dioxide Removal	Research and policy development	Hard	$$

Enabling initiative – Expand Markets for Sustainably Harvested Long-Lived Wood Products

Draft Material

Description:	Advance the use of high value timber for long lived products while advancing forest health and forest carbon sequestration. Displace GHG-intensive building materials (steel, concrete) with long-lived wood products (carbon sequestered in cross-laminate timber, hard wood floors) that reduces the net building and infrastructure GHG and store carbon long-term
Action type:	Market development, Research
Cost and funding considerations:	$$ ($25M - $100M)
Ease of implementation:	Medium;
Example case studies:	other states like Maine and Oregon have embraced mass timber while few projects in New York are underway

Risks / Barriers to success	Possible mitigants
• Revision of NYS uniform building codes • Cost of construction compared to other methods • No plants currently operate in NYS, meaning construction material would need to arrive ready to use, or a plant would need to be established to process materials • Low softwood density in NYS means raw material would likely need to be transported in-state • Life Cycle benefits uncertainty for some use cases • Architects and builders do not have as much experience with mass timber and other low carbon bio-based building products	• Incentivize the use of mass timber construction which has substitution, storage, and sequestration benefits • Revise NYS uniform building codes for easier implementation of construction projects • Expand the current efforts of SUNY ESF, to have mass timber dormitories on SUNY campuses • Use mass timber construction in the new DEC Environmental Stewardship building at the Great NYS Fair • Sponsor pilot construction and retrofit efforts to educate builders alongside life cycle analysis and economic quantification to more clearly demonstrate benefits

Enabling initiative – Expand Markets for Sustainably Harvested Long-Lived Wood Products

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Revision of NYS uniform building codes; Advance building code changes to include the embedded carbon standard in the international building code in NYS codes	DOS	2-3 years	NYSERDA
Enhance NYS supply chain for harvested wood products; fund innovation to develop mass timber applications using northern hardwoods	DEC; ESD, AGM	5-10 years	ESFPA, Wood Products Development Council
Changing state procurement specifications to be performance-based to allow wood products to qualify	OGS		
Remove barriers and create incentives for using wood for infrastructure applications, including bridges, sound barriers, transportation hubs, utility poles, marine and foundation pilings, retaining walls, docks, and piers	DOT, PANYNJ,	5-10 years	

Enabling initiative – Expand Markets for Sustainably Harvested Long-Lived Wood Products

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Outreach and education to construction industry and public on MassTimber construction (fire safety, high-rise applications)	DEC, AGM	1 year	Industry partners
State to require a minimum portion of mass timber and harvested wood products in new construction of state and municipal facilities and publicly financed buildings and infrastructure	OGS, DEC	3-5 years	DASNY, HCR
Support R&D, demonstration, and technology transfer of wood utilization and wood innovations to scale the use and climate benefits of wood in the built environment	NYSERDA, AGM, DEC	1-5 years	ESFPA, Wood Products Development Council
Promoting carbon sequestering materials that are substitutes for energy efficiency materials that are fossil-based (e.g., hemp insulation replacing foams)	NYSERDA, DEC	2-3 years	AGM, HCR, DASNY

Enabling initiative – Expand Markets for Sustainably Harvested Long-Lived Wood Products

Anticipated Benefits and Impacts	
Disadvantaged communities	Promote the value of building with wood in affordable housing to save time and money, provide safe and healthy housing, stimulate jobs, reduce embodied carbon emissions, and enhance carbon storage. The use of clean, low carbon products that have low off-gassing and toxicity will be another benefit to disadvantaged communities
Health and co-benefits	Sustainable harvest practices and improved utilization of high grade wood provides an economic driver for conservation of natural and working lands, particularly when customers want verified low carbon products. Ecosystem conservation will also translate to benefits for human health, water quality and air quality. Improve quality of living for tenants and others which impacts physical and mental health. Bio-based products will also often have a safer profile when installed and from cradle to end of life. Bio-based products also have end-of-life opportunities, in a circular economy landfill wastes are reduced. Modular application of mass timber drives cost efficiencies for construction projects by shortening the urban installation time which also reduces site emissions/nuisances
Just transition: businesses and industries, workers	New York's forests and wood products industries are currently directly responsible for nearly 40,000 well-paying jobs and more than $13 billion of economic output and are indirectly responsible for another 53,000 jobs and nearly $10 billion of economic activity. Generates manufacturing and construction jobs. Creates new market for existing secondary wood products industries such as flooring, millwork and molding for interior design. MassTimber has the potential to be designed and manufactured in modular capacity in rural locations, creating rural jobs with safer and more efficient conditions
Other	Supports sustainable management of NYS forests which maintains or increases forest carbon stocks, while producing an annual sustained yield of bio-based feedstocks from the forest.

Enabling initiative – Sustainable biomass feedstock action plan for 2050 hard-to-decarbonize products

Draft Material

Description:	This plan will identify feedstock volumes and production methods that utilize NYS biomass resources in a sustainable, sequestration maximizing manner to create replacements for hard to decarbonize fuels while considering other uses for these feedstocks. Fuel derived from biomass will likely have a limited but strategic role in New York's 2030 and 2050 needs
Action type:	Research and Plan development
Cost and funding considerations:	$, <$25M total cost
Ease of implementation:	Medium. A comprehensive plan is a significant undertaking with many elements that would require coordination and may be challenging.
Example case studies:	

Risks / Barriers to success	Possible mitigants
Competition for finite land area to grow a variety of products (food, feed, fiber, fuel) The benefits, environmental and social impacts, and limitations are highly dependent on the specific combination of the source of energy, management, logistics, spatial and temporal scales, conversion technologies, co-products, end-use efficiency, environmental and social externalities, and the baseline to which an energy pathway is compared Reduced carbon availability for recycling into soils, impacts and nutrient management Requires comprehensive look at role of other biofuels as well as other uses for the biomass inputs	Focus on wastes and residues as feedstocks, anticipated 2050 fuels needed should frame 2030 feedstock development and associated infrastructure. Apply criteria to assess the energy, environmental, and social benefits, impacts, and limitations of all energy pathways (e.g., biomass, solar, wind, fossil etc.) and to select pathways with highest and best use of our limited natural resources with low risks of undesirable environmental and social impacts Incentivize carbon storage in soil through amendments like biochar Focus on closed-loop processes where possible and in-state feedstock development to meet in-state demand. Matching the conversion technology to the fuel source and to the products needed (i.e., jet fuel, chemicals, etc) is essential to achieve the maximum economic returns and long-term performance from a bioenergy system.

Enabling initiative – Sustainable biomass feedstock action plan for 2050 hard-to-decarbonize products

Draft Material

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Establish rigorous energy, greenhouse gas, and environmental sustainability guidelines and metrics	DEC, NYSERDA, AGM	2-3 years	Academia
Identify bioenergy pathways with high life cycle energy efficiency (from land-harvest, conversion, and delivery to the end user) that replace fossil fuels and complement next generation energy delivery systems	NYSERDA	2-3 years	
Identify 2050 hard to decarbonize fuel needs (e.g., high quality distillate jet fuels) and incentivize appropriate bioenergy development (feedstock supply chain, conversion systems, and end use markets) to meet these needs.	NYSERDA	2-3 years	
Prioritize use of feedstocks that are residues from existing agricultural, forest, and waste systems. (through preferential pricing in product development proposal)	DEC, AGM	2-3 years	
Activate former agricultural and underused lands (including former industrial lands) for more productive uses, one of which could be purpose-grown biomass	AGM, DEC	3-5 years	
Fund energy systems that can best support a net-zero carbon economy in NY. NYSERDA and the Green Bank to develop programs that leverage private capital to invest in conversion technology for bio-based feedstock into bio-based products	NYSERDA	Ongoing	

Enabling initiative – Sustainable biomass feedstock action plan for 2050 hard-to-decarbonize products

Anticipated Benefits and Impacts	
Disadvantaged communities	Interim fuels and infrastructure systems ensure near-term affordable energy alternatives to traditional fossil fuel systems (e.g., boilers) or promote affordable bio-electricity further encouraging the transition to electrification in both rural and urban areas
Health and co-benefits	Increases forest area under active professional management, increases forest management for maximum sequestration. Keeps our forests as forests, avoids conversion of forests to other land uses, and enables private forest owners to invest in management that not only maintains but scales carbon sequestration, clean water and wildlife habitat. Combustion of biomass could lead to increased air emissions and impacts to public health; any consideration of combustion must address this issue
Just transition: businesses and industries, workers	Develops markets for low grade wood products, increasing value to rural industries. Create new opportunities in rural areas (e.g., agricultural/forestry jobs, biomaterial processing jobs, and infrastructure development and maintenance). New York's forests and wood products industries are currently directly responsible for nearly 40,000 well-paying jobs and more than $13 billion of economic output and are indirectly responsible for another 53,000 jobs and nearly $10 billion of economic activity. Strengthen our existing bioeconomy for the future and to ensure a supply chain of feedstock and, workers and innovation to unleash new biobased products.
Other	Supports sustainable management of NYS forests and ag lands which maintains or increases carbon stocks, while producing an annual sustained yield of bio-based feedstocks.

Enabling initiative – Increasing market access for NY low-carbon products

Description:	Enhancing carbon sequestration, greenhouse gas mitigation, and economic development opportunities by reducing barriers and creating competitive advantage for NY produced low carbon products
Action type:	Market development; Research & Development
Cost and funding considerations:	$$ ($25M - $100M) Low carbon products available in the near-term have comparable cost characteristics to fossil-intensive products after accounting for positive externalities but lack production capacity in Northeast U.S. Public-private partnerships would support initial technology deployment.
Ease of implementation:	Hard for implementation due to policy novelty and lack of NYS-specific carbon intensity calculations for many fossil-intensive products. Moderate for post-implementation under model in which producers of fossil and low carbon products provide LCAs that are reviewed and certified by DEC.
Example case studies:	

Risks / Barriers to success	Possible mitigants
Measurement and verification of carbon content is complex and if not done properly can erode market confidence LCA data availability for covered fossil products Deployment of low carbon substitutes to fossil products Interim maintenance of existing low carbon supply chains Permitting timeframes and lack of technology awareness	Look to leverage existing certification standards Confidential producer analysis of covered fossil products Combine with low carbon preferential procurement policies Base product coverage on TRL of low carbon substitutes Leverage in-state academic/industry expertise on low carbon products & conduct needed research to increase certainty in verification, leading to low carbon product standards

Enabling initiative – Increasing market access for NY low-carbon products

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
ESD Economic Analysis & Research Team to begin tracking and reporting on this market to spot emerging trends, innovative applications, external market opportunities, growth opportunities to guide the development	ESD, DEC	1 year	
Spur innovation through lead by example in low carbon procurement requirements for state government (e.g. bio-based products, low carbon concrete)	OGS,		DEC, NYSERDA, PANYNJ
Commence a technology readiness level analysis of low carbon substitutes for fossil-intensive products and fuels; Identify the high value products from bio-based processing of New York grown feedstocks and invest in production facilities	NYSERDA, ESD	1-3 years	DEC, ESD, Industry, Academia
Strategic use of incentives to drive scale-up of high-demand products when the low carbon alternative is not yet cost competitive with the fossil-intensive option	ESD	3-5 years	Industry, DEC, NYSERDA

Enabling initiative – Increasing market access for NY low-carbon products

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Develop standards and guidelines for defining a low carbon product, including ensuring sustainable feedstock production	DEC, NYSERDA	2 years	Industry, Academia, ESD
Expand access to low interest loans or grants for existing NYS businesses to develop new low carbon products lines by educating local banks on emerging bio-technologies and offering NYGB loan guarantees	DFS, NYGB, NYSERDA		
Create a low-carbon products portal to facilitate connecting NYS producers to corporations and other buyers that have made GHG emission reduction commitments, expand the NY Grown program to cover more products and adding a low-carbon aspect to this program	DEC, AGM,	2 years	Industry
Enhance the public's understanding of the bioeconomy and its role in implementing the CLCPA	AGM, Academia		SUNY ESF, NYSAF
Develop low carbon fuel requirements for hard to electrify applications	DEC, NYSERDA		

Enabling initiative – Increasing market access for NY low-carbon products

Anticipated Benefits and Impacts	
Disadvantaged communities	Transitioning industrial emitters located primarily in disadvantaged communities to low carbon fuels could decrease co-pollutant emissions (studies indicate).
Health and other co-benefits	In the transition to electrification and for applications that are difficult to electrify, low carbon fuels can have reduced co-pollutant emissions as compared to fossil emissions at industrial emitters, leading to health benefits. Many low carbon product feedstocks (e.g., willow) provide ecosystems and bioremediation services during growth.
Just transition: businesses and industries, workers	20,000 new jobs are potentially expected in the low carbon products sector in NYS. Low carbon processing is an enabling technology for the broader transition to a decarbonized economy. Significant opportunities exist for worker training, especially within disadvantaged and rural communities, including partnering with local labor unions and community colleges. Investment in market development would provide the market certainty needed to deploy a thriving low carbon processing sector within NYS while minimizing opportunities for carbon leakage.
Other	Reduced landfilling, increased value proposition for building materials via carbon sequestration potential, reduced uncertainty in long-term market for initial producers of low carbon products, correction of market failure caused by lack of externality internalization. Creates market value for sequestering products which drives down the costs of sequestration policies

Enabling initiative – Financial and Technical Assistance for Low-Carbon Product Development

Description:	Provide financial and technical assistance to grow a bioprocessing industry in New York that utilizes low-grade wood and other biomass residuals to create bio-based substitutes for fossil-intensive products
Action type:	Engineering support, supply chain development, and financial incentives
Cost and funding considerations:	$$ ($25M - $100M) Costs to support existing supply chains can be through public-private partnerships, agency funding, and/or federal grants and support.
Ease of implementation:	Easy due to current availability of both decarbonization technology and existing supply chains. Work with academia and industry to identify qualifying near-term decarbonization investments.
Example case studies:	

Risks / Barriers to success	Possible mitigants
1. Owners of existing supply chains lack capital/margins to make near-term decarbonization capacity investments 2. Owners of existing supply chains lack technical expertise to make near-term decarbonization capacity upgrades	1. Provision of financial incentives to qualifying near-term decarbonization capacity investments 2. Provision of regulatory and technical support to qualifying near-term decarbonization investments.

Enabling initiative – Financial and Technical Assistance for Low-Carbon Product Development

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Development of criteria for qualifying near-term bioprocessing capacity investments.	NYSERDA	6-12 months	DEC, ESD, SUNY ESF
NYSERDA financial and technical initiatives to identify and promote the high value outputs from New York bioprocessing inputs	NYSERDA	Ongoing	DEC, REDCs
Define sustainable feedstock production for bio-based processing to determine feedstock volume and practices that maximize sequestration, part of biomass action plan	NYSERDA, DEC, AGM	2 years	CALS, CAFRI
Create an economic development initiative focused on attracting bioprocessing/bio-based product businesses to NYS	ESD	2 years	
Preferential pricing for in-state low grade feedstocks that maximize carbon sequestration (organic waste streams, wood residues, marginal land)	DEC, AGM	2-3 years	
NYSERDA and the Green Bank to develop programs that leverage private capital to invest in conversion technology for bio-based feedstock into bio-based products	NYSERDA, NYGB	Ongoing	

Enabling initiative – Financial and Technical Assistance for Low-Carbon Product Development

Anticipated Benefits and Impacts	
Disadvantaged communities	Potential for reinvigoration of idled rural production sites such as sawmills, create projects at existing NYS infrastructure that is able to support future deep decarbonization projects following the deployment of next-generation technology.
Health and co-benefits	Substantial health benefits are expected from reduced fossil emissions by emitters that interact with existing supply chains. Bio-based products will also often have a safer profile when installed and from cradle to end of life. Bio-based products also have end-of-life opportunities, in a circular economy landfill wastes are reduced
Just transition: businesses and industries, workers	New York's forests and wood products industries are currently directly responsible for nearly 40,000 well-paying jobs and more than $13 billion of economic output and are indirectly responsible for another 53,000 jobs and nearly $10 billion of economic activity. Significant opportunities exist for worker training, especially within disadvantaged and rural communities, including partnering with local labor unions and community colleges. Near-term decarbonization of existing supply chains is an enabling technology for the broader transition to a decarbonized economy via the maintenance of those supply chains. Supply chain retention is an important factor in carbon leakage prevention.
Other	Reduced landfilling, increased value proposition for building materials via carbon sequestration potential, reduced uncertainty in long-term market for initial producers of low carbon products, correction of market failure caused by lack of externality internalization. Supports sustainable management of NYS forests which maintains or increases forest carbon stocks, while producing an annual sustained yield of bio-based feedstocks from the forest.

Enabling initiative – Bio-based Products Research Development & Demonstration Overview

Description:	Develop a comprehensive Innovation Roadmap to guide key priorities for deep decarbonization and net sequestration investment in the areas of biobased low-carbon fuels, products, and sequestration that considers intersection of industrial/manufacturing, agriculture, transportation, and power generation sectors. Fund Innovation challenges and select projects that can scale beyond business as usual
Action type:	Research initiative, Project demonstration/pilot
Cost and funding considerations:	$, $1 million required for initial roadmap analysis with additional funding research and early-stage pilots to be determined pending the outcome of the analysis.
Ease of implementation:	Medium
Example case studies:	*EU Update of the 2012 Bioeconomy Strategy; Roadmap for the Blue Bioeconomy*

Risks / Barriers to success	Possible mitigants
1. Research scope will need to be tightly defined to ensure meaningful recommendations can be ascertained. 2. Decarbonization efficiency will need to be quantified via a metric such as carbon abatement cost to enable comparison of low carbon pathways with net sequestration pathways.	1. Utilize expert elicitation to determine appropriate research scope. 2. Utilize in-state expertise on life cycle assessment and techno-economic analysis to establish best practices on decarbonization efficiency quantification.

Enabling initiative – Bio-based Products Research Development & Demonstration Overview

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Development of research agenda scope	NYSERDA	<1 year	DEC, Academia
Release of solicitation to perform research	NYSERDA	1-2 years	
Fund research and pilot/demonstration projects	NYSERDA	Ongoing	ESD, NYPA, DEC

Enabling initiative – Bio-based Products Research Development & Demonstration Overview

Anticipated Benefits and Impacts	
Disadvantaged communities	Research must take account of potential impacts to economic development, ecosystem services, and human health in disadvantaged communities in which pilot projects would be located.
Health and other co-benefits	Research must quantify criteria pollutant emissions, ecosystem services, and bioremediation potential of deep decarbonization and net sequestration pathways analyzed under roadmap. This will enable pathways that contribute to improvements in these areas to be considered for pilot funding.
Just transition: businesses and industries, workers	The roadmap will identify the economic growth potential of the pathways considered in the form of market size, jobs growth across the supply chain, and workforce development requirements/opportunities.
Other	

Enabling initiative – Net Negative Carbon Dioxide Removal (CDR)

Description:	Advance deployment of atmospheric natural and technological CDR technologies through 2050 based on UN IPCC projections for needed volume of atmospheric CO2 removals and long-term sequestration (carbon storage beyond net zero)
Action type:	Research and policy development
Cost and funding considerations:	$$ ($25M - $100M), Currently available CDR technologies require financial incentive in range of DEC's value of carbon to be economically feasible. Many CDR strategies provide co-benefits (e.g., ecosystem remediation) that offset costs elsewhere.
Ease of implementation:	Hard for implementation due to policy novelty and lack of existing CDR certification and monitoring infrastructure in NYS. Moderate for post-implementation as best practices are deployed and infrastructure established.
Example case studies:	U.S. 45Q tax credit

Risks / Barriers to success	Possible mitigants
1. Verifiable and maintainable carbon dioxide removal that results go beyond net zero and achieve negative GHG emissions 2. Deployment of CDR projects, costs, land-use trade-offs	1. Regular CDR certification and monitoring 2. Provide long-term incentive value via DEC SCC 3. Invest in research to establish standards for life cycle benefits to prioritize investments in the most impactful strategies

Enabling initiative – Net negative Carbon Dioxide Removal (CDR)

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** *(Entities that need to be engaged)*
Set clear goals and standards regarding the need for removal, evaluate solutions viable today and monitor solutions that could be viable in the future	NYSERDA, DEC	2 years	CALS, CAFRI
Identification of verifiable and maintainable CDR technologies and pathways	NYSERDA	2-3 years	DEC
Initial work to focus on nature-based CDR pathways with options to employ technology-based pathways in the future	DEC, AGM, NYSERDA	2-3 years	
Implementation of CDR certification and monitoring infrastructure	DEC	3 years	NYSERDA
Continuous monitoring and updating of certifications	NYSERDA	Ongoing	DEC
Develop R&D agenda and priorities	NYSERDA, DEC	1 year	Academia
Fund demonstration projects	NYSERDA	3-5 years	

Enabling initiative – Net negative Carbon Dioxide Removal (CDR)

Anticipated Benefits and Impacts	
Disadvantaged communities	Many CDR technologies provide associated positive externalities (e.g., ecosystem services, improved air quality, reduced ag pollution) and would benefit communities that have disproportionately experienced harm from negative externalities of current energy mix.
Health and co-benefits	Many CDR feedstocks (e.g., ag waste, dedicated energy crops) provide ecosystem and bioremediation services during growth. CDR technology biochar shows promise for urban organics management, or as a replacement for fly ash in concrete. Net negative CDR provides long-term and permanent storage of atmospheric carbon
Just transition: businesses and industries, workers	Significant opportunities exist for CDR project worker training, especially within disadvantaged and rural communities, including partnering with local labor unions and community colleges. Many CDR pathways are enabling technologies for the broader transition to a decarbonized economy.
Other	Correction of market failure caused by lack of externality internalization.

Avoided Conversions Recommendations

Mitigation strategy summary: Avoided Conversion

Initiative #	Description	Action type	Emissions impact	Ease of implementation	Cost
1	Keep Forests as Forests: Maintain and enhance the state's carbon sequestration potential through avoided forest conversion	Legislative (Budget, Programmatic); Regulatory	High	Easy for land acquisition. Difficult for new tax credits and regulatory changes	$$$

Mitigation strategy – Initiative # 1: Avoided Forest Conversion: Overview

Description:	Keep Forests as Forests: Maintain and enhance the state's carbon sequestration potential through avoided forest conversion		
Action type:	Legislative (Budget, Programmatic); Regulatory		
GHG reduction by 2030:	High	**GHG reduction by 2050:**	High
Cost and funding considerations:	$$$: Environmental Protection Fund, tax incentives, staffing needed to implement land acquisition goals, audit tax credit and provide technical assistance		
Ease of implementation:	Easy for land acquisition. Difficult for new tax credits and regulatory changes		
Example case studies:			

Risks / Barriers to success	Possible mitigants
• Passage of Legislation • Cost to taxpayers for acquisition and tax incentives • Landowner interest • Nearly 700,000 forest landowners • Number of municipalities/home rule • Potential tax base impact to municipalities • Sprawl needs to be managed effectively	• State reimbursement of municipalities must be sufficient to address tax shift caused by Forest Tax Law • Prioritize CEs as appropriate, and provide resources for adequate long-term stewardship • Invest in partner capacity • Bolster local forest economies • Restore state open space conservation funding to historic levels (2008 EPF included 60 million) • Reinvigorate NYS Open Space planning process with emphasis on conservation as a climate strategy • Increasing focus of state economic development incentives to reduce sprawl and spur climate smart investments in community development

Mitigation strategy – Initiative #1: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Land Acquisition (fee and CE) by state, municipalities, land trusts	DEC	10 years	Municipalities, land trusts
Statutory change to Real Property Tax Law amending current 480a and creating tracks including forest carbon management. Address deficiencies in current 480a to make program more attractive to private forest landowners and easier to administer, and to further sustainability goals.	Legislature, DEC	3 years	DTF, DEC, Municipalities, Legislature, NYFOA, ESFPA, SAF, NGO's
Keep Forests as Forests Law – Require mitigation of forest carbon loss due to conversion for development.	Legislature, DEC	3 years	Municipalities, NYFOA, ESFPA, SAF, NGO's
Forest Carbon Markets	Legislature, TBD	5 years	Municipalities, NYFOA, ESFPA, SAF, NGO's
Note: LULG is leading on local land use recommendations.			

Mitigation strategy – Initiative #1: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Continued sustainable management of NYS forests which maintains or increases forest carbon stocks, while producing an annual sustained yield of bio-based feedstocks from the forest.	DEC, AGM	Ongoing	CAFRI, NYSAF, NYFOA, ESFPA,
Enhance local capacity for land conservation – Community Preservation Act (incl working lands), Conservation Partnership Program, etc.	Legislature, DEC, AGM	Ongoing	Municipalities, land trusts, SWCDs
Strengthen Right to Practice Forestry Law	Legislature	1 year	Municipalities, DOS
Outreach and technical assistance to landowners on forest management, estate planning/intergenerational transfer, outreach to public on importance and contribution of working forestlands	DEC	Ongoing	SUNY ESF, Cornell, AGM, NGOs, SWCDs
Research agenda to support avoided conversion – quantification for No Net Loss, prioritize conservation activities, monitoring to quantify policy impacts	DEC	1 year, ongoing	SUNY ESF, Cornell, AGM, NGOs
State legislation to secure local government ability to maintain roads as minimum maintenance roads to reduce development pressure	Legislature, DOS	1 year	Municipalities, landowners

Mitigation strategy – Initiative #1: Benefits and impacts

Anticipated Benefits and Impacts	
Disadvantaged communities	Need to increase access to land, resources, education, training, and incentives for BIPOC. Include indigenous consultation and deeper community engagement
Health and co-benefits	Air and water quality. Numerous studies in the U.S. and around the world are exploring the health benefits of spending time outside in nature, green spaces, and, specifically, forests. Reduce emissions from vehicle use from prevented sprawl development. Wildlife habitat, outdoor recreation, flood mitigation
Just transition: businesses and industries, workers	Need to provide an alternative for location of housing and business development
Other	Allows lower and middle income landowners to keep their lands and manage them more sustainability. Harvested wood product markets support this strategy and are discussed in the Advance Markets for Sustainably Harvested Long-Lived Wood Products and Sustainable biomass feedstock action plan for 2050 hard-to-decarbonize products strategies. This strategy will be supported by the LULG Advisory Panel's recommendation on facilitating and supporting collaborative county-wide and regional smart growth comprehensive planning.

Enabling strategy summary: Avoided Conversion

Initiative #	Description	Action type	Ease of implementation	Cost
1	Avoided agricultural land conversion - Maintain and protect the states' potential for carbon sequestration on agricultural lands through avoided farmland conversion	Legislative (Budget, Technical/ Programmatic)	Easy	$$
2	Enhance local government planning for land conservation	Legislative, Technical Assistance	Easy	$
3	Bolstering Local Agricultural Economies	Legislative (Budget, Technical/ Programmatic)	Easy	$-$$

Enabling strategy – Initiative #1: Avoided Agricultural Land Conversion: Overview

Description:	Maintain and protect the states' potential for carbon sequestration on agricultural lands through avoided farmland conversion; enhance farm viability, increase food security, and implement smart growth to reduce future GHG emissions from VMTs.
Action type:	Legislative (Budget, Technical/ Programmatic)
Cost and funding considerations:	$$: Environmental Protection Fund, staffing needed to implement farmland protection goals and provide technical assistance
Ease of implementation:	Easy for land acquisition.
Example case studies:	US Climate Alliance Toolkit, Carbon Farm Study

Risks / Barriers to success	Possible mitigants
• Cost to taxpayers for acquisition of conservation easements and tax incentives • Landowner interest • Number of municipalities/home rule • Data for land conversion and quantification of GHG reduction • Land access and transfer	• Incentives for intergenerational transfer and farmland access • Incentives for intergenerational family transfer and support for farm succession. • Support for farmland protection and improved access for historically underserved including, BIPOC and beginning farmers. • Youth engagement, internships and educational opportunities • Leasing state land to new farmers, prioritizing beginning, socially disadvantaged, limited resources and women farmers • Providing tax incentives for farmers to lease or sell land to qualified farmers, with a higher tax incentive for lease or sale to beginning, socially disadvantaged, limited resource and women farmers.

Enabling strategy – Initiative #1: Avoided Agricultural Land Conversion: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Increase funding for Farmland Protection programs to plan for agriculture and purchase Development Rights (through conservation easements) by state, municipalities, and land trusts.	AGM	10 years	Farmers, Municipalities, land trusts, SWCDs
Farmland access: Assist farmers in securing long-term leasing and farm transfer to historically underserved including, BIPOC, beginning farmers, socially disadvantaged, limited resources, and women farmers. Support youth engagement, internships and educational opportunities.	AGM	Ongoing	Farmers, Municipalities, land trusts, SWCDs
Continue and strengthen agricultural assessment and agricultural districts programs	AGM	1 year	Farmers, Municipalities, land trusts, SWCDs
Enhance local capacity for land conservation – Community Preservation Act (incl working lands), Conservation Partnership Program, transfer of development rights, etc.	Legislature, DEC, AGM	Ongoing	Farmers, Municipalities, land trusts, SWCDs
Support and enhance farmland access and succession programs	AGM	Ongoing	Farmers, Municipalities, land trusts, SWCDs

Enabling strategy – Initiative #1: Avoided Agricultural Land Conversion: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Make connections between existing programs to increase co-benefits. Target protected farmland for agricultural BMPs that reduce GHG emissions and sequester carbon like soil health management practice systems.	AGM, DEC, NRCS, FSA	Ongoing	Farmers, Municipalities, land trusts, SWCDs, NRCS, FSA
Develop new data sets to support avoided conversion. Develop monitoring and quantification methodology to measure impacts of avoided conversion.	AGM, Cornell	1 year, ongoing	Cornell, SWCDs, Municipalities, farm owners, NRCS
Expand education and technical assistance for beginning farmers and generational transfer. Assist farmers with business planning and modeling. Expand supply chain development for new products.	AGM, CCE, Cornell, SWCDs	Ongoing	American Farmland Trust, Land Trusts, Farmers, NRCS, Landowners, Farm Bureau, Financial Institutions
State legislation to secure local government ability to maintain roads as minimum maintenance roads to reduce development pressure	Legislature, DOS	1 year	Municipalities, landowners

Enabling strategy – Initiative #1: Avoided Agricultural Land Conversion: Benefits and impacts

Anticipated Benefits and Impacts	
Disadvantaged communities	Increasing planning, technical services, and financial assistance improves access to programs and effective practices for all farmers. Emphasis on access to conservation technical assistance and funding programs to historically underserved and disadvantaged community members, including farmers identifying as BIPOC, women owned, low income, veteran, or beginning farmers. Include indigenous consultation and deeper community engagement. Utilize existing programs that provide economic support to farms, like farmers markets or the Fresh Connect Checks Program, to connect vulnerable populations to healthy local food.
Health and co-benefits	Agricultural land protection captures carbon in the land base and prevents future emissions from vehicle use from prevented sprawl development. Protecting farmland has the potential to elevate local food production and resiliency, water quality, air quality, storm/flood mitigation, public infrastructure protection, drought resiliency, habitat, economic development and jobs.
Just transition: businesses and industries, workers	Need to provide an alternative location of housing and business development (infill). Improve the resiliency of communities by improving food security Inter-generational family transfer, improved access for BIPOC and beginning farmers, youth engagement, internships and educational opportunities, public and private sector job creation, on-farm job creation.
Other	Reducing emissions from prevented sprawl development will only be achieved through strategic farmland protection, coupled with planning and smart growth. This strategy will be supported by the LULG Advisory Panel's recommendation on facilitating and supporting collaborative county-wide and regional smart growth comprehensive planning.

Enabling initiative – Initiative #2: Enhance local government planning for land conservation: Overview

Description:	Require inclusion of forestland and farmland conservation planning in Comprehensive Planning - Provide technical assistance to municipalities for master planning, zoning, model local laws
Action type:	Legislative, Technical Assistance
Cost and funding considerations:	$ - Technical assistance staff, grants, support for Environmental Management Committees and Conservation Advisory Councils.
Ease of implementation:	Easy – enhance existing programs
Example case studies:	Smart Growth program, Hudson River Estuary Program

Risks / Barriers to success	Possible mitigants
Home rule Resources for planning	Replication of HREP style support across state Support planning through Smart Growth and other programs

Enabling initiative – Initiative #2: Enhance local government planning for land conservation: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Legislation requiring inclusion of forestland and farmland protection in comprehensive plans	Legislature	3 years	DEC, AGM, DOS, municipalities, municipal associations, NGOs
Technical Assistance to implement legislation effectively	DOS, DEC, AGM	Ongoing	municipalities, municipal associations, NGOs
Provide technical assistance to municipalities regarding land preservation and easements, strategies and best practices for land conservation.	DOS, DEC, AGM	Ongoing	municipalities, municipal associations, NGOs

Enabling initiative – Initiative #2: Enhance local government planning for land conservation: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Create resources to support local and regional smart growth planning and decision-making (e.g. maps to identify suitable reforestation locations, highest value cropland, idle lands for farming, etc)	DOS, DEC, AGM	Ongoing	municipalities, municipal associations, NGOs
Conduct quantitative survey of land resources across the state and identification of critical barriers including options of using idle and underutilized lands.	DOS, DEC, AGM	Ongoing	municipalities, municipal associations, NGOs

Enabling initiative – Initiative #2: Enhance local government planning for land conservation: Benefits and impacts

Anticipated Benefits and Impacts	
Disadvantaged communities	Include recreational access as a component of forest planning. Include farm and forest land access for disadvantaged communities including BIPOC. Include indigenous consultation and deeper community engagement. Food security enhanced by keeping land in farming in communities.
Health and other co-benefits	Air and water quality. Maintain food and crop production in NYS communities, maintain carbon sequestration of farm and forest land in NYS. Numerous studies in the U.S. and around the world are exploring the health benefits of spending time outside in nature, green spaces, and, specifically, forests. Reduce emissions from vehicle use from prevented sprawl development. Wildlife habitat, outdoor recreation, flood mitigation. Avoided vehicle emissions from avoided development. Increase the availability of local nutritious food to mitigate and prevent chronic disease.
Just transition: businesses and industries, workers	Need to provide an alternative for location of housing and business development (infill) Improve the resiliency of communities by improving food security
Other	This strategy will be supported by the LULG Advisory Panel's recommendation on facilitating and supporting collaborative county-wide and regional smart growth comprehensive planning.

Enabling initiative – Initiative #3: Bolstering Local Agricultural Economies: Overview

Description:	Support emission reductions by enhancing existing programs, and promoting the expansion of those programs, that encourage farm viability and resilient communities through the production and consumption of local food
Action type:	Legislative (Budget, Technical/Programmatic)
Cost and funding considerations:	$-$$: Funding needed to support programmatic needs and staffing
Ease of implementation:	Easy; supporting existing initiatives
Example case studies:	There is a lot of research on impacts of food miles, institutional purchasing of local products, community agriculture, etc.

Risks / Barriers to success	Possible mitigants
- Cost of expanding programs - Interest in participation from farms and communities	- Promote expansion of farmers markets and incentive programs for disadvantaged communities such as seniors, veterans and SNAP recipients within these markets through programs like the Fresh Connect Checks Program and Farmers Market Nutrition Program - Improve implementation of the 2013 Food Metrics Law to enhance state procurement of local foods - Enhance urban food production and greening efforts through programs such as the Community Gardens Program - Connect institutions, like schools, universities, food banks, hospitals and prisons, who procure large volumes of food from out of state to local buying opportunities through initiatives like Farm-to-School and Nourish NY

Enabling initiative – Initiative 3: Bolstering Local Agricultural Economies: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Expand existing programs in the state that support local procurement of NYS agricultural products.	AGM; OGS; ESD	0-3 years depending on resources	Institutions, NGOs
Engage with communities and producers to advertise these opportunities	AGM- Council on Hunger and Food Policy; ESD	0-3 years depending on resources	Municipalities, NGOs, Agricultural Associations
Expand education and technical assistance for beginning farmers and generational transfer. Assist farmers with business planning and modeling. Expand supply chain development for new products.	NYSAGM, CCE, Cornell	Continual	American Farmland Trust, SWCDs, Farmers, Landowners, Farm Bureau, Financial lenders

Enabling initiative – Initiative #3: Bolstering Local Agricultural Economies: Benefits and impacts

Anticipated Benefits and Impacts	
Disadvantaged communities	Provide additional resources to existing programs that connect vulnerable populations, such as SNAP recipients and under served communities of color, to healthy local food. Emphasis on access to technical assistance and programs to historically underserved and disadvantaged community members, including farmers identifying as BIPOC, women owned, low income, veteran, or beginning. Improvements in food production capacity, resiliency and diversity have a positive effect on disadvantaged communities.
Health and other co-benefits	Increase the availability of local nutritious food to mitigate and prevent chronic disease. Potential to elevate local food production, diversify farm incomes and increase farm profitability. Systems also provide resiliency, water quality, air quality, storm/flood mitigation, public infrastructure protection, drought resiliency, habitat, scenic vistas/tourism, market diversification, economic development and jobs.
Just transition: businesses and industries, workers	Improve the resiliency of communities by improving food security Support economic viability of farms to maintain agricultural careers
Other	

Forest Management Recommendations

Mitigation strategy summary

Initiative #	Description	Action type	Emissions impact	Ease of implementation	Cost
1	Maintain and increase carbon sequestration in NYS forests by securing forest regeneration, improving forest health and productivity, and restoring degraded forests through the widespread adoption of improved, sustainable forest management practices	Statutory, Incentives	High. 3.3-11.0 million metric tons of CO2 e per year	Medium	$$-SSS
2	Increase forested acres through afforestation and reforestation efforts to establish climate adapted and resilient forests. There an estimated 1.7 million acres of marginal lands available for establishing forests.	Statutory, Incentives	High 5-12 million metric tons CO2 e per year	Medium	SSS
3	Increase and maintain tree cover in urban and developed areas to reduce energy use and corresponding GHG emissions through the shading and cooling effect of trees. Increase carbon sequestration through tree establishment and extending the average life of urban trees through improved maintenance.	Statutory, Incentives	Medium	Medium	SS

Mitigation strategy – Initiative #1

Draft Material

Improved, Sustainable Forest Management

Description:	Maintain and increase carbon sequestration in NYS forests by securing forest regeneration, improving forest health and productivity, and restoring degraded forests through the widespread adoption of improved, sustainable forest management.		
Action type:	Legislative (RPTL 480a), Regulation, Incentive		
GHG reduction by 2030:	Carbon sequestration-High.	**GHG reduction by 2050:**	Carbon sequestration-High
Cost and funding considerations:	$$-$$$. Substantial investment in NYS forests and forest sector over current levels. Overall cost will depend on state reimbursement levels to local municipalities under current and new tax abatement programs. Increase in funding to cost share and grant programs for private landowners, current and future forest health mitigation efforts and increases in funding to improve forest management on state and municipal lands. Increase agencies staffing levels to deliver and manage programs. Goal of 5 million acres under professional management by 2030 through these proposals		
Ease of implementation:	Medium. Mechanisms, practices and programs for improved forest management exist. Mitigation costs per acre can be high due to invasive species and regeneration issues. Strategy needs to be delivered on a such a scale to improve millions of acres of existing forest to have a significant carbon impact		
Example case studies:	Vermont Current Use Program, Family Forest Carbon Program, FLEP and EQIP, Working Woodlands		

Risks / Barriers to success	Possible mitigants
1. Cost to private landowners in time and money 2. Cost to local municipalities and state budget 3. Scale of effort 4. Landowner interest in government programs 5. Workforce gaps in private and public sectors 6. The unpredictability of current and future forest health threats 7. Landowner knowledge of public and private programs	1. Diverse, private wood markets 2. Simplifying programs and removing administrative barriers for landowners 3. Private industry/public partnership for funding grants/cost sharing projects 4. State reimbursement to local governments must be sufficient for tax incentives to work 5. Building forest resiliency measures into all efforts and programs 6. Creative Financing through NY Green Bank or creation of Forest Carbon Bank 7. Widespread landowner outreach

Mitigation strategy – Initiative #1: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Create a new RPTL 480b real property tax incentive to allow private forest landowners to conserve their forests in their natural condition to participate a tax program. Tax benefit to landowners increases as the years of commitment increase, recognizing the accumulated sequestration benefits over time. 25-acre eligibility. A carbon forest management plan written by a carbon certified forester is required if harvesting. Initial benefit starts at a lower level than 480a and 480c. Up to 100% reimbursement to local municipalities.	DEC	3 years	Legislature, NYFOA, ESFPA, SAF, NGO's, Landowners, NYS Tax and Finance, Local municipalities
Create a real property tax incentive, RPTL 480c to provide forest landowners a tax incentive to undertake practices that increase carbon stocks while addressing need for additionality. A carbon forest management plan written by a carbon certified forester is required if harvesting. 25-acre eligibility Practice and/or forest carbon inventory based. Tax benefit to landowners increases as the years of commitment increase, recognizing the accumulated sequestration benefits over time. Up to 100% reimbursement to local municipalities	DEC	3 years	Legislature, NYFOA, ESFPA, SAF, NGO's, Landowners, NYS Tax and Finance, Local municipalities
Amend 480a statute and regulations to induce greater landowner participation and integrate stronger sustainability provisions (e.g., forest regeneration). The primary goal remains to encourage sustainable timber management. Tax abatement benefit for landowners remains unchanged. Up to 100% reimbursement to local municipalities.	DEC	3 years .	Legislature, NYFOA, ESFPA, SAF, NGO's, Landowners, NYS Tax and Finance, Local municipalities

Mitigation strategy – Initiative #1: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Enhance agency and partner capacity to deliver free forest carbon and forestry technical assistance and education programs (e.g., Forest Stewardship Program, AEM, PRISM, Master Forest Owners, etc.) to forest landowners. Improve agency and partner coordination in delivery and reporting of forestry services to maximize efficiency	DEC/CCE/SWCD/NGO's	1 Year	SWCD NYFOA, ESFPA, SAF, NGO's, CCE, Landowners, USDA
Expand funding for cost share programs, such as Regenerate NY and AEM to assist forest landowners in widespread implementation of project-based practices to protect and increase carbon stocks on private forestland. Projects would focus on forest regeneration, restoring degraded forests and installation of best management practices for forest carbon.	DEC/CCE/SWCD/AGM/ NGO	1 year	Legislature, SWCD NYFOA, ESFPA, SAF, NGO's, Landowners, USDA
Establish caches across the state to allow operators to borrow forestry and logging equipment and devices on a short-term basis needed for implementing best management practices during logging operations.	DEC, SWCD, NGO, Wood Products Development Council	1-2 Years	SWCD, Industry, NGO's
Provide funding for low interest loans or grants for upgrading to new logging or manufacturing equipment to facilitate, increased utilization, improved forest management or best management practices (e.g. lower site impacts). Example: Machine tracks for wheeled harvesters to lower soil impacts.	Wood Products Development Council, NGO's	1 year	Legislature, SWCD NYFOA, ESFPA, SAF, NGO's

Mitigation strategy – Initiative #1: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Increase prevention of invasive forest pests and diseases entering New York and the U.S (e.g.SMART trade). Work with federal and state partners to strengthen regulations, inspection and enforcement of wood packaging material and live plant imports. Improve surveillance for forest health and disease	DEC	1-2 years	USDA-APHIS, AGM, ESFPA, SAF,
Reduce the loss of forest carbon due to acute forest health issues on private and public forest. Facilitate increased capacity to create rapid response teams where needed for invasive plant removal and forest pest and disease response (e.g., ALB). Priority would be on intervening where rapid, extensive loss of forest carbon sequestration capacity could occur.	DEC	1 year	Legislature, SWCD NYFOA, ESFPA, SAF, NGO's
Create a NY Forest Carbon Bank. A carbon bank would allow New York State to finance Greenhouse Gas (GHG) reduction and carbon sequestration activities by NYS farm forests and forest landowners by allowing entities to buy tons of carbon from forest landowners generated through improved land management practices that increase carbon sequestration.	DEC, NYSERDA	1-2 years	Legislature, SWCD NYFOA, ESFPA, SAF, NGO's

Mitigation strategy – Initiative #1: Benefits and impacts

Anticipated Benefits and Impacts	
Disadvantaged communities	Strategy will benefit rural economically disadvantaged communities, including those in EJ areas, by improving the forest-based economy and increasing job opportunities. Allows lower to middle income landowners to hold on to their lands, maintain open space, keep forest as forest, and sustainably manage their lands.
Health and co-benefits	Numerous studies in the U.S. and around the world are exploring the health benefits of spending time outside in nature, green spaces, and, specifically, forests. Co-benefits to this strategy include avoided forest conversion, supporting forest and forestry sector jobs in rural communities, improved forest ecosystem resiliency and soil health, improved forest productivity, enhancing wildlife habitat, protecting water quality, maintaining rural character and providing public recreational opportunities.
Just transition: businesses and industries, workers	Mitigation strategy would expand the opportunities available to forestry-based businesses in rural areas of New York; by increasing the demand for forestry services including natural resources professionals, certified herbicide applicators, forestry equipment operators, and mill operators. Ancillary benefits of forest-based recreation businesses.
Other	Sustainability measures already in place or being develop through this strategy are integral to many of the proposed Bioeconomy recommendations.

Mitigation strategy – Initiative #2 Afforestation/Reforestation: Overview

Description:	Increase forested acres through afforestation and reforestation efforts to establish climate adapted and resilient forests. There are up to 1.7 million acres of marginal lands available for establishing forests.		
Action type:	Regulation (DEC, AGM), Incentive (DEC, AGM)		
GHG reduction by 2030:	Carbon Sequestration-High	**GHG reduction by 2050:**	Carbon Sequestration-High
Cost and funding considerations:	$$$. Upgrading state tree nursery capacity. Costs of labor, trees, tree protection and long-term maintenance. Specialized tree planting equipment will be needed. Increased staffing and volunteers.		
Ease of implementation:	Hard. Need to identify priority acres where afforestation and reforestation are likely to succeed. Seek out opportunities for enhancing natural afforestation success. Long term maintenance on private lands is needed for long term survivorship of established forests		
Example case studies:	CCC efforts in the 1930's and 40's planted around 300,000 acres in NYS		

Risks / Barriers to success	Possible mitigants
1. Cost	1. Private industry/public partnership for funding projects
2. Establishing resilient forests	2. State of the Art Marketing Campaign
3. Landowner enthusiasm	3. Reforestation resources and services covered for landowners; landowners provide land
4. Labor intensive	4. Corp or internships, technology to reduce labor costs
5. Workforce gaps in private and public sectors	5. Federal Assistance
6. Nursery capacity	6. Investments in nursery capacity and seeding technology
7. Deer herbivory	7. Statewide deer management and local controls (e.g., hunting, culling, fencing)
8. Forest pests and pathogens	8. Increased investment in PRISMs, tree-smart trade, and other related strategies
9. Seed and seedling availability	
10. Term of enrollment must be sufficient to deliver benefit	

Mitigation strategy – Initiative #2: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Establish NY Tree Corp (or Climate Corp) to provide direct tree establishment and maintenance services to public and private landowners. Regionally based Tree Corp would be provided with staff and equipment to establish and maintain seedlings at no or low cost.	SWCD/DEC/AGM	3 years	Legislature, NYFOA,SWCD, ESFPA, SAF, NGO's, landowners, USDA
Expand cost share funding for existing tree establishment and maintenance programs such as Regenerate NY and AEM programs. These existing programs can help move reforestation/afforestation efforts forward while larger efforts, such as the NY Tree Corp become established.	DEC/SWCD/AGM	1-2 years	Legislature, SWCD, USDA NYFOA, ESFPA, SAF, NGO's
Increase state tree nursery capacity to support large scale afforestation and reforestation efforts. Upgrade to expand tree species offerings to meet adaptation and resiliency challenges. Enhance seed collection and storage efforts, seedling production, workforce development, pre- and post-planting practices.	DEC	3 Years	Legislature, NYFOA,SWCD, ESFPA, SAF, NGO's, landowners
Develop an opportunity assessment to identify areas where afforestation and reforestation are likely to succeed. Seek out opportunities for enhancing natural afforestation success, which could be more economical	DEC/SWCD/AGM	3 years	Legislature, NYFOA,SWCD, ESFPA, SAF, NGO's
Expand or create new, free tree seedling programs such as Buffer in a Bag programs to assist landowner with smaller project areas. Explore partnerships with local governments and regional organizations to scale up programs.	DEC/SWCD	2 years	Legislature, NYFOA, ESFPA, SAF, NGO's

Mitigation strategy – Initiative #2: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** *(Entities that need to be engaged)*
Work with public and private partners on reforestation efforts in ROW areas of the state. Focus on tree and shrub species compatible with power transmission and distribution ROW's, roadside areas, pipelines, railroads, etc. Public outreach for right tree, right place is needed.	DEC, NYPA	1-2 years	NYPA, DOT, Municipalities, ISA (UAA), Industry
Tree Planting Equipment Loan Program to allow landowners and operators access to specialized equipment for small- and large-scale tree planting projects.	SWCD/DEC	1-2 years	Legislature, SWCD, NYFOA, ESFPA, SAF, NGO's
Enhance agency and partner capacity to deliver technical assistance and education programs to landowners. Assist with planting plans, site and species selection. Promote tree planting programs. Increase partner cooperation to meet requests, ensure minimal overlap of services, capture accomplishments and coordinate efforts.	DEC/CCE/SWCD/AGM/NGO	1 year	Legislature, NYFOA, ESFPA, SAF, NGO's
Develop an opportunity assessment to identify areas where afforestation and reforestation are likely to succeed. Seek out opportunities for enhancing natural afforestation success, which could be more economical. Consider 480c as incentive.	Academia/SWCD/DEC/CCE	1-2 years	Legislature, NYFOA,SWCD, ESFPA, SAF, NGO's
Investment in seeding and seeding technology to fill in smaller forest gaps where needed. Drone, robotic technology to distribute seeds in areas regeneration needs to be supplemented after a treatment.	DEC	1-2 years	Legislature, NYFOA,SWCD, ESFPA, SAF, NGO's

Mitigation strategy – Initiative #2: Benefits and impacts

Anticipated Benefits and Impacts	
Disadvantaged communities	Strategy will benefit rural, economically disadvantaged communities, including those in EJ areas, by improving the forest-based economy and increasing job opportunities. Provides valuable job experience and training in tree planting and forestry sector through volunteer opportunities, internship and full and part time jobs in rural areas
Health and co-benefits	Numerous studies in the U.S. and around the world are exploring the health benefits of spending time outside in nature, green spaces, and, specifically, forests. Co-benefits to this strategy include avoided agricultural conversion, supporting forest and forestry sector jobs in rural communities, improved forest ecosystem resiliency and soil health, improved forest productivity, enhancing wildlife habitat, protecting water quality, and maintaining rural character.
Just transition: businesses and industries, workers	Mitigation strategy would expand the opportunities available to forestry-based businesses in rural areas of New York; by increasing the demand for forestry services including natural resources professionals as well as certified herbicide applicators, tree planters and forestry equipment operators. Increased job opportunities from expanded public and private nursery capacity.
Other	

Mitigation strategy – Initiative #3
Urban Forestry

Description:	Increase and maintain tree cover in urban and developed areas to reduce energy use and corresponding GHG emissions through the shading and cooling effect of trees. Increase carbon sequestration through tree establishment and extending the life of urban trees through improved maintenance.		
Action type:	Emission Reduction and Carbon Sequestration		
GHG reduction by 2030:	Medium	**GHG reduction by 2050:**	Medium
Cost and funding considerations:	$$. Increasing grant funding to communities and expanding to individual landowners. Higher cost of establishing urban trees vs. planting trees in fields. Increased staffing resources for program delivery.		
Ease of implementation:	Medium. Sustained tree maintenance after establishment in harsher environments. Most urban and community trees are privately owned		
Example case studies:			

Risks / Barriers to success	Possible mitigants
Requires staff to manage additional workload. Sufficient availability of trained individuals to preform tree work. Sufficient availability of resources/ equipment to preform tree work. Availability of suitable growing stock to plant. Ensuring survival of trees planted. Most urban and community trees are privately owned	Utilizing third party project/ grant managers (not for profits) to handle multiple projects on a regional level. Work with professional organizations (ISA, TCIA, for profit training groups) to develop training programs that can be rolled out statewide. Develop guidance and work with other agencies/ municipalities to establish shared resources such as equipment caches.

Mitigation strategy – Initiative #3: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Increase funding levels of Urban and Community Forestry Grants to assist local municipalities in the management of the urban forest which includes planning, planting and maintenance of trees, Provide funding opportunities for private individuals to establish and maintain privately owned trees.	DEC	1-2 years	Local communities, arborists
Develop guidance and provide support to local communities to establish or expand youth and young adult conservation corps that employ and train disadvantaged youth and provide a source of skilled labor for increasing, maintaining and improving the management of the urban forest	DEC, SWCD,	1-2 years	NY Society of Arboriculture, local governments, non-profit organizations
Develop an opportunity assessment to focus tree establishment and maintenance efforts within urban areas and communities where the most climate, societal, and public health benefits are likely to be achieved.	Academia/SWCD/DEC/ CCE	1-2 years	Legislature, NYFOA,SWCD, ESFPA, SAF, NGO's
Develop guidance and provide support and funding to local communities for planning and implementing planting and maintenance projects that help communities adapt to climate change. This may include sharing resources (equipment, staff, bulk ordering, etc.). This will help communities maintain critical ecosystem services like flood mitigation, clean air, clean water, reduced sediment and nutrient runoff, reduced energy use, shade and improved human health	DEC	1 year	DOS, ESD, nonprofit organizations, local governments, USDA

Mitigation strategy – Initiative #3: Benefits and impacts

Anticipated Benefits and Impacts	
Disadvantaged communities	Urban communities in EJ areas will benefit from increased tree canopy and open spaces through increased public health benefits, property values, reduced energy costs, and recreational opportunities. A community engaged in urban forestry activities improves the overall quality of life.
Health and co-benefits	Numerous studies in the U.S. and around the world have shown and continue to explore the mental, physical and societal health benefits of spending time outside in nature, green spaces, and —specifically— forests. Significant co-benefits to this strategy include urban forests more resilient to the negative impacts of climate change; Overall improved public health, mitigation of heat island effects, and providing public recreational opportunities
Just transition: businesses and industries, workers	Provides increased volunteer and job opportunities to local communities. Services for arborits, tree service and utility line workers could increase based on increased tree maintenance activities.
Other	

Enabling strategy summary

Initiative #	Description	Action type	Ease of implementation	Cost
1.	Expand funding climate, forest carbon and applied forest management peer reviewed research	Scientific Research	Medium	$-$$
2.	Develop and support workforce development and training programs for forest sector workers to enable an increase demand in forestry services to be met. Incorporate forest carbon and forest carbon management into training programs and forestry curriculums at the high school (e.g., BOCES) and college level.	Training, Implementation	Medium	$
3.	Facilitate the development of a forest-based culture and economy through state-of-the-art outreach, education and marketing techniques to inform the public and policy makers about forest and forest carbon issues	Outreach and Education	Hard	$-SS

Enabling initiative – Initiative #1: Climate and Forest Carbon Research: Overview

Description:	Expand funding for peer reviewed climate, forest carbon, and applied forest management research
Action type:	Research
Cost and funding considerations:	$-$$. Provide funding for researchers, facilities, assistants and equipment needed to sustain a robust forest carbon research effort over time.
Ease of implementation:	Medium. Sustaining funding over time and during difficult economic times.
Example case studies:	

Risks / Barriers to success	Possible mitigants
1. Sustaining funding for long term forest research 2. Biased research to further a particular agenda 3. Public and policy-makers education in forestry and climate issues 3. Cost	1. Identifying long term public and private funding sources, such as forest industry, private foundations, and state budget 2. Published peer reviewed research as a measure of success. 3. Creating new ways to disseminate or demonstrate results

Enabling initiative – Initiative #1: Forest Carbon Research

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Support research needs of improved forestry management mitigation strategies. Focus on peer reviewed forestry and forest carbon research in New York State Forests, such as improving forest resilience and vigor, regeneration and forest soil carbon.	Academia, DEC	1-2 years	AGM. CCE, WPDC NYFOA, ESFPA, SAF, USDA,
Develop a suite of forestry practices designed to improve forest carbon storage and sequestration in New York forests. Practices would be deployed across state funded forestry programs to achieve consistency.	Academia, DEC	1-2 years	CCE,NYFOA, ESFPA, SAF, USDA, WPDC
Develop efficient, cost effective monitoring and verification systems for accurately measuring forest carbon to evaluate practices and programs over time.	Academia, DEC	1-2 years	CCE,NYFOA, ESFPA, SAF, USDA, WPDC
Research using science-based decision systems that enables the leveraging of climate change investments to make more efficient and cost-effective decisions on forest-based climate change initiatives.	Academia, DEC	1-2 years	CCE,NYFOA, ESFPA, SAF, USDA, WPDC

Enabling initiative – Initiative #1: Forest Carbon Research

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Research on the most cost-effective methods of using trees and short rotation woody corps (e.g., shrub willow, miscanthus) to sequester carbon on marginal lands.	Academia, DEC, AGM	1-2 years	CCE,NYFOA, ESFPA, SAF, USDA
Increase urban forestry and forest carbon research to maximize the carbon and other benefits of establishing and maintaining urban forests. Focus on	Academia, DEC	1-2 years	CCE,NYFOA, ESFPA, SAF, USDA
Fund research into long term new and emerging Natural and Working Lands solutions to meet our 2050 goals.	Academia, DEC, AGM	1-2 years	CCE, NYFOA, ESFPA, SAF, USDA
Increase research into emerging forest products and forest product markets as it relates to bioeconomy and harvested wood product initiatives	Academia, WPDC, DEC	1-2 years	CCE, NYFOA, ESFPA

Enabling initiative – Initiative #1: Benefits and impacts

Anticipated Benefits and Impacts	
Disadvantaged communities	Provide research employment and volunteer opportunities for students from disadvantaged communities. Demonstration sites or projects could be in EJ areas for urban forestry projects.
Health and other co-benefits	Improving sustainable forestry practices lead to healthier, more productive forests. Research universities and institutions are local economic engines that support the local communities they are located in. They also often include educational programing and events for the general public.
Just transition: businesses and industries, workers	May provide increased job opportunities based on the new products or methods developed through research efforts. Forest sector workers may find new types of positions.
Other	

Enabling initiative – Initiative #2: Workforce Development: Overview

Description:	Develop and support workforce development and training programs for forest sector workers meet an increase demand in forestry services. Incorporate forest carbon and forest carbon management into training programs and forestry curriculums at the high school (e.g., BOCES) and college level.
Action type:	Training and Education
Cost and funding considerations:	$. Private/Public funding partnership opportunity. Increase funding to Wood Products Development Council, forestry colleges, BOCES. Some federal funding may be available.
Ease of implementation:	Medium. Existing programs are in place that could be scaled up and expanded. Some additional areas of need may need to be identified.
Example case studies:	

Risks / Barriers to success	Possible mitigants
1. Liability insurance at facilities 2. Lower paying, more dangerous jobs 3. Cost of training and education to the worker, student or employer 4. Long term success of moving trainees/students into careers	1. Using state, federal or PPP funding to cover training and education costs to eliminate barriers for employers and individuals 2. Improve on safety training within programs 3. Provide state support to bolster programs 4. Evaluate how many student/trainees go into and remain in forestry careers

Enabling initiative – Initiative #2: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** (*Entities that need to be engaged)*
Improve Cooperating Consulting Forest Policy, CP-36: Require continuing education in forest carbon or forest carbon management. Improve the rigor and accountability of the program	DEC	1 Year	SAF, NYFOA, ACF
Forest Carbon Certification Program: Qualified participants would receive a certification credential that allows them to work under state funding forestry and forest carbon programs.	DEC	1 Year	SAF, ACF, ESFPA
Lower the initial fee or provide cost share dollars for forestry workers to obtain their NYS Pesticide Applicator's license	DEC or WPDC	1-2 years	CCE, SAF, ACF, ESFPA
Support and bolster existing state, NGO, or industry urban forestry and utility forestry training programs. Integrate forest carbon and forest carbon management into programs	DEC	1-2 years	ISA, Releaf, Academia, Public Utilities, Industry
Provide support for existing training apprenticeship programs for careers in forestry and forest product across the entire supply chain from the woods to the mill. Incorporate forest carbon and forest carbon management into training programs and forestry curriculums at the high school (e.g., BOCES) and college level.	Wood Products Development Council	1 Year	Paul Smiths College, SUNY, BOCES, Workforce Development Institute (WDI)
Bolster state support for Trained Logger Certification to develop and implement new training modules around improved forestry practices including forest carbon best management practices (BMP's) designed to increase carbon sequestration(e.g. reduced soil carbon loss through improved harvesting techniques).	DEC	1-2 years	TLC, ESFPA, Academia

Enabling initiative – Initiative #2: Benefits and impacts

Anticipated Benefits and Impacts	
Disadvantaged communities	Increased job opportunities in rural economically disadvantaged communities. Initiative supports local workers and economy to remain in local communities and NY state by providing the skills necessary to succeed. Keeps local forest industry and manufacturing knowledge intact to position itself to take advantage of new, emerging markets.
Health and other co-benefits	Initiative increases logger safety through training and through increased availability of newer, safer, modern equipment. A better trained forest sector workforce will improve implementation of forestry and climate strategies. Co benefit also include improved water quality, forest productivity and increased public confidence in foresters and loggers.
Just transition: businesses and industries, workers	Maintaining employment in natural resource sectors and related industries. Prevents displacement of workers and industries.
Other	

Enabling initiative – Enabling initiative – Initiative #3 Outreach and Education: Overview

Description:	Facilitate the development of a forest-based culture and economy through state-of-the-art outreach, education and marketing techniques to inform the public and policy makers about forest and forest carbon issues
Action type:	Education and Implementation
Cost and funding considerations:	$ - $$. The cost of sustained state-of-the-art marketing campaigns, social and traditional media, training, and increase in trained outreach staff.
Ease of implementation:	Medium. Behavior change takes time and requires research-based strategies. Behavior change strategies have been successfully implemented for an array of campaigns
Example case studies:	Wisconsin DNR, TELE

Risks / Barriers to success	Possible mitigants
1.Technical concepts and language 2.Misinformation and opposing public perceptions 3.Potential increased costs to consumers associated with bioeconomy products 4. Proper technical guidance on tree establishment/maintenance for municipalities, tree company's, utilities and general public	1.Stewardship and Cooperating Forester Outreach Training 2.Happy Little Tree Marketing Campaign 3.Bio-Economy Promotion 4. Increase urban forestry outreach efforts

Enabling initiative – Initiative #3 Outreach and Education: Components of the strategy

Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Stewardship and Cooperating Forester Outreach Training: Provide foresters with training, technical assistance, and resources on landowner engagement and climate change.	DEC	1 year	NYFOA, ESFPA, MFO/CCE
Bio-Economy Promotion: Engage social media influencers and wood product manufactures to promote NYS wood products as trendy, local, and sustainable. This includes supporting and promoting traditional wood products, emerging markets and urban wood utilization	Wood Products Development Council	2 years	DEC, AGM, ESFPA
Build public acceptance for forest management and increase the adoption of climate focused private forest management. Communicate clear and simple messages that connect forestry and management to the things people value (clean air, water, recreation, etc.).(e.g Happy Little Trees Marketing Campaign)	DEC	2 years	MFO/CCE, NYFOA
City and Municipality Engagement: Provide outreach messaging toolkits to urban foresters, city planners, and local officials. Toolkits will focus on the climate and other co-benefits of urban forests, private forest management, and local wood products.	DEC	1 year	Municipalities

Enabling initiative – Initiative #3 Outreach and Education: Components of the strategy

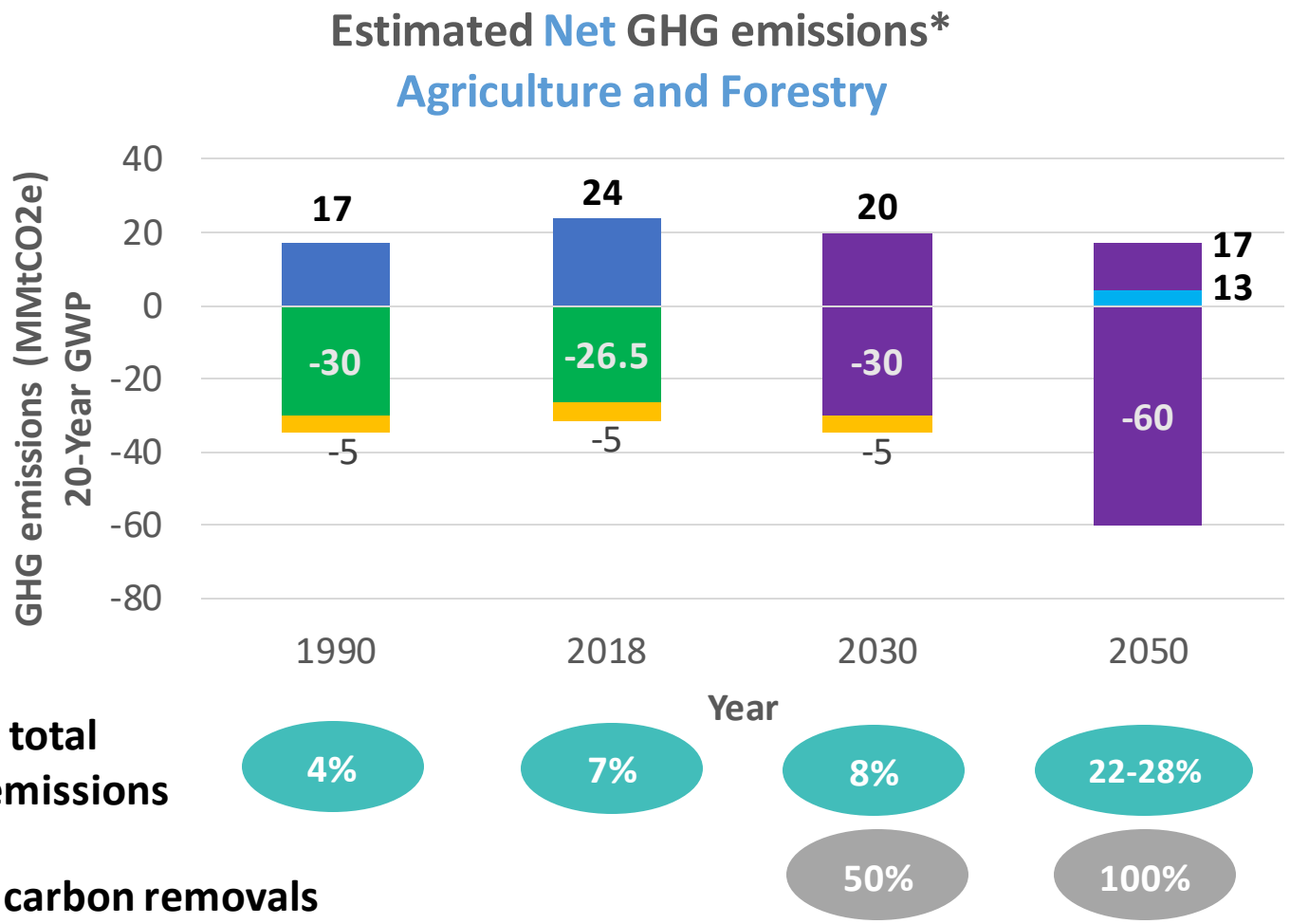
Components required for delivery *(Brief description of action required)*	**Implementation lead** *(Entity responsible for completing)*	**Time to implement** *(Time required to implement)*	**Other key stakeholders** **(***Entities that need to be engaged)*
Education and outreach, especially in underserved communities is important in order to achieve a successful tree planting program. Residents in underserved communities are often skeptical of government led improvement projects. Identifying and working with local partners to establish and develop E&O opportunities.	DEC, EJ	1-2 Years	Local government, nonprofit organizations
Increase the promotion of urban forestry and tree care through TreeLine USA for utilities, TreeCity USA for communities and Tree Campus for college campuses. Support increased ReLeaf efforts in communities across the state.	DEC	1-2 Years	ReLeaf, Arbor Day Foundation, Municipalities, Private and Public Universities, Public Utilities, Industry

Enabling initiative – Initiative #3 Outreach and Education: Benefits and impacts

Anticipated Benefits and Impacts	
Disadvantaged communities	Promotion of a bio-based, forest economy is likely to indirectly support the economic wellbeing of rural New Yorkers and may provide opportunities to low-income communities in those areas.
Health and other co-benefits	There is research to suggest that the use of wood products in the built environment has benefits for human health. One such study can be found here.
Just transition: businesses and industries, workers	Training foresters in better communication practices is likely to enhance the skillsets of natural resource professionals. Outreach tools for municipalities and natural resource professionals will serve to enhance landowner engagement and can indirectly expand opportunities for the forest industry.
Other	Planned communication strategies for natural resource professionals is likely to improve outcomes for private landowners. Private landowners will benefit from a better trained workforce and a suite of outreach tools that provide them with a better understanding of the benefits and risks of forest management.

Aggregated Emission Reduction/Sequestration Estimated Impact

Aggregate GHG emissions impact of Agriculture and Forestry panel recommendations



Scope (2018 Subtotal):

- **Agriculture Emissions: Livestock and Fertilizer Nutrient Management (24mmt)**
- **Forestry and Agroforestry (-26.5mmt)**
- **Cropland, Grassland, Urban Trees (-5mmt)****

Advisory Panel Workplan Goals:

- Reduce current Agriculture Emissions at least 15% by 2030 and 30% by 2050, returning to 1990 levels.
- Return to 1990 levels of annual forest carbon sequestration by 2030.
- Achieve the CLCPA Net Zero Goal across all lands.

Additional Ambition:

- Further reduce Agriculture Emissions to 13mmt CO2e by 2050.

* Estimates will be further refined during the Integration Analysis and historical GHG inventory data is draft.

** Not a full land use assessment.

Next Steps