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June 28, 2022

Draft Scoping Plan Comments
NYSERDA
17 Columbia Circle
Albany, NY 12203-6399

Re: Energy Vision Comments on New York's Draft Scoping Plan

On behalf of Energy Vision, a New York-based 501c3 environmental research organization, I welcome the opportunity to submit comments on the Climate Action Council's (CAC's) Draft Scoping Plan (DSP).

The attached comments center on the three sectors/sections of the DSP with the greatest relevance to Energy Vision's own research and recognized expertise – Waste, Agriculture and Transportation. The common theme across these sectors is the need to address methane emissions and opportunities to transform New York's organic waste feedstocks from a climate liability into a climate-smart solution. Central to this theme is the role of anaerobic digestion and the production and use of renewable natural gas ("RNG") derived from organic wastes in reducing New York's methane emissions and generating carbon-neutral or carbon-negative energy. RNG can play this role without significant expansion of fossil fuel infrastructure, but by leveraging existing infrastructure in advancing the energy transition.

Renewable natural gas is included in each of the Draft Scoping Plan's scenarios, which we welcome. However, at the macro level we offer the following points, which are further detailed in our comments:

- Anaerobic digestion is barely mentioned in the DSP – beyond its use already in wastewater treatment – despite the fact that is a primary solution for managing/mitigating methane emissions from New York's solid waste, wastewater and dairy operations. Also, to categorize anaerobic digesters as a "source" of methane is not consistent with peer-reviewed and well-established lifecycle carbon accounting metrics.
- In-state supplies of RNG will be limited. Based on a recent NYSERDA-funded study, New York-generated RNG could displace 50% of industrial natural gas consumption, 28% of on-highway diesel fuel, or 3% of total state-wide natural gas use. Energy Vision's research concludes that New York can achieve the greatest environmental, economic and public health benefits by prioritizing the use of RNG in hard-to-decarbonize sectors like heavy-duty transportation and industry.
- As you are not doubt aware, there is significant coordinated and vocal opposition to RNG from various groups representing environmental/environmental justice constituents. This opposition appears to be rooted in ideological goals of "no combustion" and "electrify

everything," not in climate science or technical/technological expertise. Our own research, and an abundance of research from academia, government, international organizations and the private sector, indicates that it would be a mistake to exclude RNG from a final Scoping Plan, given the critical role this technology can play in converting the state's methane emissions into low-carbon or carbon-negative energy.

We encourage the CAC to use the accompanying comments to inform its work on a final Scoping Plan, and we are happy to provide any additional information or clarification that we can.

Thank you in advance for your consideration.

Sincerely,

Matthew P. Tomich
President

INTRODUCTION

We welcome the chance to offer Energy Vision's comments on the Climate Action Council's Draft Scoping Plan (DSP) for implementation of the Climate Leadership and Community Protection Act (CLCPA).

Background on Energy Vision and the Focus of our Comments: Energy Vision, founded in 2007, is a New York City based 501(c)(3) environmental research organization that analyzes and promotes adoption of the clean, renewable, low- and no-carbon energy and fuel resources that will be essential for achieving sustainable economies in the 21st century.

While Energy Vision tracks multiple technologies, since 2010 we have focused primarily on renewable natural gas, or RNG, derived from organic wastes. Based on our research, RNG not only has the potential to reduce dependence on fossil fuels, cut methane emissions and generate carbon-neutral or carbon-negative energy, but also to prevent waste, reduce urban air pollution, improve agricultural economics, and generate rural and urban jobs in a new clean fuels industry. Our research is supported by that of the US Environmental Protection Agency (EPA), the US Department of Energy (DOE)'s Argonne National Laboratory, the United Nations, the European Union, the Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA).

Using anaerobic digesters (ADs) to turn organic wastes—from inedible food, green scraps, agricultural manures and wastewater—doesn't simply produce biogas that can be converted to RNG. It also, in the form of the "digestate" (left over organic material), produces high-quality agricultural nutrients that can be used to displace synthetic fertilizers in New York's $5 billion-plus agricultural sector.

Energy Vision's focus on "waste-to-value" and the circular economy gives our team a deep understanding of organic waste feedstocks; the technologies for putting them to beneficial use; biogas and RNG; markets for digestate; and relevant policies at the federal and state level that can promote the scaling of anaerobic digestion and biogas upgrading in both urban and rural areas. Recognition of our expertise has seen us organize more than two dozen RNG workshops at the request of US cities and states, and government agencies in Canada, China, South Africa and Tunisia. We are also regularly approached by North American, European and Asian institutional investors seeking to deploy capital in sustainable infrastructure, circular economy and "waste-to-value" technologies, solutions and projects.

Energy Vision's experience and expertise has put us in a unique position to provide input on the DSP. We hope this input will be of value in framing the state's programs in three key economic sectors:

- Waste
- Agriculture
- Transportation

The central focus of our comments in all these areas is the extent to which they enable the State to reduce emissions of methane most rapidly and cost effectively. According to the New York GHG Inventory released in 2021 ("the 2021 GHG Inventory"), methane constitutes approximately 35% of the state's total GHG emissions. Cutting it significantly will be essential for our State to achieve its 85x50 emissions reduction goal. It will also be essential if the US is to meet its 30% methane reduction obligations coming out of 2021's COP26 in Glasgow.

The methane from wastes and agriculture is a by-product of normal human activity. But given its potency as a greenhouse gas, and that it comprises a disproportionately high percentage of the state's GHGs, capturing this methane and beneficially reusing it as energy is not something we should do simply because we can—it is something we should do because we must.

Approximately 36% of New York's methane emissions come from organic materials in the waste sector (waste managed in-state, exported waste, and wastewater) and from agricultural manure—the equivalent of 47.5 million metric tons of CO2e. This methane can be captured using anaerobic digestion and then beneficially reused as energy in the form of low-carbon or net carbon-negative RNG fuel. RNG can be deployed in hard-to-decarbonize sectors of the economy such as heavy-duty transportation, natural-gas-reliant manufacturing, and buildings that cannot readily be electrified.

According to a recent study completed for NYSERDA by consulting firm ICF, RNG potential in New York State, based on anaerobic digestion alone, is nearly 40 million MMBTUs of energy.[1] Used in transportation, this could displace 300 million gallons of diesel fuel—or 23% of New York's 2019 on-highway diesel fuel consumption.[2]

Based on our research and expertise, two of the most pressing shortcomings of the DSP are 1) the apparent reluctance to acknowledge that anaerobic digestion is the primary proven solution to reduce methane emissions from solid waste and livestock manure; and 2) the failure of the DSP to unequivocally support adoption of a Clean Fuel Standard. We urge a commitment to both in the Final Scoping Plan as critical for meeting its goals.

WASTE

In the DSP, the waste sector includes wastewater and solid materials; the strategies for addressing these sources include "waste reduction, reuse, recycling (including organics recycling), combustion, and landfilling." Our comments focus primarily on methane reduction, and so will address landfilling (in and out of state), organics recycling instead of landfilling, and wastewater.

Landfilled Solid Waste

Per the DSP, the "most obvious and well-documented contribution to GHG emissions from the management of waste is from the uncaptured emissions of methane from landfills" (page 235).

According to the 2021 GHG Inventory, solid waste destined for landfilling inside or outside the state emitted approximately 35MMT carbon-dioxide-equivalent (CO_2e) of methane—nearly 27% of total methane emissions, or 9% of total GHGs. 56% of these methane emissions came from solid waste landfilled in the state, and 44% from exported waste.

Landfill methane is emitted by organics—primarily food waste, as well as "green waste" (e.g. lawn, garden and park clippings) and soiled paper waste. Diverting these materials to anaerobic digesters would allow virtually all of this methane to be captured, and then beneficially reused to produce net carbon-negative energy that could displace fossil fuels.

Energy Vision's extensive research of municipal and state organics recycling programs indicates that the key requirements for keeping organics out of landfills are landfill diversion mandates *combined with expanded education and outreach*, **plus** financial and policy support for the buildout of key anaerobic digestion infrastructure. Education, outreach, and financial and policy support were largely missing from New York's 2019 Food Donation and Food Scraps Recycling Law. Therefore, we strongly support inclusion of the following measures laid out in Section W1 in the Scoping Plan:

[1] New York State Energy Research and Development Authority (NYSERDA). 2021. "Potential of Renewable Natural Gas in New York State," NYSERDA Report Number 21-34. Prepared by ICF Resources, L.L.C., Fairfax, VA 22031. nyserda.ny.gov/publications. 40 million MMBTUs is an average of the report's "achievable deployment" and "optimistic growth" scenarios for anaerobic digestion (not including thermal gasification).

[2] 23% of New York's highway diesel consumption based on US EIA data.

*- Reduce disposal of organics by expanding 2019's Food Donation and Food Scraps Recycling Law to phase-in organics source-separation, eventually ban combustion[3] and landfilling of organics, and put a fee-per-ton on all **unrecycled waste** to provide funds for reduction, reuse, and recycling.*

- Expand and replicate successful organics collection programs, including in multi-family buildings and public housing by DEC and housing authorities.

- Expand education and outreach for residents, schools, and generators of food scraps.

- Simplify regulations for co-location of solid waste infrastructure operation as well as siting for small-scale, non-profit facilities.

- Require local solid waste management agencies, working with DEC, to emphasize food scraps recovery programs.

- Research, facilitated by DEC, on development of recycling markets for organics/soil amendment products and end uses. (Coordination with NYSERDA and New York Ag & Markets would likely enhance these efforts.)

Energy Vision has three additional recommendations to make in this area:

1) **Pass a waste export ban**. Waste currently exported should be managed in-state as a potentially valuable energy resource. A recent ICF study for NYSERDA puts the energy potential from the organic wastes in landfills within New York at roughly 22 million MMBTU annually[4] (enough to replace over 165 million gallons of diesel fuel). The energy potential from the 44% of food and other organics currently exported (another 17.25 million MMBTU) should be analyzed and considered part of New York's RNG resource. By processing these organic wastes in New York ADs, these methane emissions would be nearly eliminated, and turned into an additional clean source of energy/fuel for New Yorkers.

2) **Improve gas monitoring and collection.** Landfills are the single largest source of in-state methane emissions, and so the largest current source of RNG potential. Landfill methane emissions are likely even higher than understood, since EPA regulations allow operators to assume 75% methane collection efficiency, though real-time monitoring is not required and rarely practiced. Improved emissions monitoring and leakage reduction is essential, both at operating facilities and those now closed, which—like the Fresh Kills landfill on Staten Island—continue to produce significant quantities of methane for decades. Improved monitoring will also inform opportunities for enhanced collection and beneficial re-use.

3) **Reclassify Anaerobic Digestion.** In the Waste section (on page 235), the DSP states, "In addition to landfills, there are other waste handling practices that produce GHG emissions… including anaerobic digestion." Detailed lifecycle assessments – in California and Europe – conclude that AD systems are a) far superior to landfills at *capturing* methane for beneficial use; and b) far better than commercial composting systems in terms of methane leakage rates. To single out AD as a *source* of emissions – whether fugitive or via combustion of biogas – but ignore similar characteristics at compost operations is misguided, if not at odds with the climate science.[5]

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[3] While we support not combusting organics, we encourage the CAC not to equate combustion with **pyrolysis**, which may have benefits in producing synthetic gases and enabling carbon capture from various sources of biomass, particularly wastewater biosolids. According to the EPA, pyrolysis may also be a method for destroying PFAS, especially in biosolids.

[4] Based on an average of the report's "Achievable Deployment" and "Optimistic Growth" scenarios.

[5] "Using remote sensing to detect, validate, and quantify methane emissions from California solid waste operations," 2020. See Page 8. https://iopscience.iop.org/article/10.1088/1748-9326/ab7b99/pdf

The State should prioritize the sector-specific technologies and solutions that make the greatest progress toward its 85x50 goals. To suggest that AD is not such a solution is based on a technological prejudice, not data, science or reality. In fact, AD is arguably *the best* option we have. We encourage the CAC to include anaerobic digestion as a proven solution – as nearly all other jurisdictions on the planet have done – within the final Scoping Plan.

Wastewater (Water Resource Recovery Facilities, or "WRRFs")

According to the 2021 GHG Inventory, WRRFs in New York State account for methane emissions equal to 6.43MMT CO2e, or approximately 16% of total methane emissions from the waste sector. The ICF study for NYSERDA puts the energy value of this methane at roughly 2.8 million MMBTU per year[6] (21 million diesel gallon equivalents). However, recent research by Energy Vision on behalf of New York City's Department of Environmental Protection (DEP) indicates that 2.8 million MMBTU is the RNG production just from *New York City's* WRRFs, once planned improvements are implemented across the system.

Roughly one quarter of the municipal WRRFs in New York State currently have anaerobic digesters. These facilities not only capture methane from sewage, but where there is spare digestion capacity, they can serve as alternative processing for food and other organic wastes that would traditionally have gone to a landfill or incinerator.

"Co-digestion" is fundamental to the DSP discussion of the role of *Water Resource Recovery Facilities,* (Section W4) and is a position strongly supported by Energy Vision research. Transforming wastewater treatment plants from a focus on waste disposal to a focus on the beneficial products such plants can produce – energy, RNG fuel and soil amendments – can turn these facilities into important contributors to a circular economy. WRRFs, which represent much of the existing capacity for organics materials management in New York, have a tremendous opportunity to reduce GHG emissions (page 244).

The critical nature and role of WRRF's cannot be overstated. However, in New York and much of the rest of the country, this infrastructure is aging and in need of significant capital investments/improvements. Prioritizing WRRF retrofits and expansions in NY represents a unique opportunity to leverage existing urban infrastructure to better manage existing and unavoidable "waste" streams.

Components of the WRRF conversion strategy that Energy Vision supports for inclusion in the final Scoping Plan include (page 245):

- *Beneficial use of biosolids and renewable biogas, recognizing that some waste generation from water treatment processes is unavoidable.*

- *Operate co-digestion programs at anaerobic digesters with existing capacity and include difficult-to-compost organics such as post-consumer food scraps and fats, oils, and grease.*

- *Increased pre-processing and de-packaging capacity throughout the State to capture more organic waste from products that are packaged but have passed their expiration dates.*

Energy Vision has two additional comments to offer:

1) **Investing in gas upgrading technology** is an important and worthwhile investment, and the final Scoping Plan should make this clear.

[6] Average of "Achievable Deployment" and "Optimistic Growth" scenarios.

Because raw biogas has a relatively low methane content and is also corrosive, it often cannot be transported. As a result, its use has historically been limited to generating electricity and/or heat on site, and if the raw biogas supply exceeds on-site demand(s), the surplus gets flared. But whether raw biogas is used in power generation or flared, its GHGs, NOx and other toxic substances can pollute local air.

Thus, the Climate Justice Working Group's expressed preference for on-site use of biogas is counter-productive. In fact, a thorough report by the NYC Environmental Alliance (NYC-EJA) concludes that odor concerns and co-pollutant emissions from combustion of raw biogas – often in historically disadvantage communities – poses public health risks.[7] Twelve of New York City's 14 WRRFs are located in or border what NYS DEC has identified as "potential environmental justice areas." On-site use of biogas that has not been upgraded to RNG means that avoidable criteria pollutant emissions – derived from unavoidable and critical infrastructure – may continue to impact these communities.

Energy Vision's research suggests that all biogas captured in anaerobic digesters should be cleaned or "upgraded" to valuable, saleable, clean-burning RNG by removing moisture, hydrogen sulfide, siloxanes and other impurities. Installation of gas cleanup systems also opens the door for capture and beneficial re-use of the biogenic CO_2 in biogas. Investment in biogas upgrading at WRRFs is a proven, high-impact and cost-effective use of funds.

2) **Support Pipeline Interconnection(s).** The DSP (page 245) refers to the CJWG's preference "that no significant new transmission infrastructure should be allowed to support additional biogas." We agree that no *new* "significant [pipeline] infrastructure" is needed, but we can't ignore the fact that the state *has* significant pipeline infrastructure that now carries and delivers fossil natural gas. Repurposing this infrastructure to transport low- and no-carbon renewable gas(es) makes climate and economic sense. To do so will require short, low-pressure "pipeline interconnections" to link an AD production source to the existing gas grid. We agree that criteria should be developed for such interconnections, including better monitoring and enforcement of methane leakage.

AGRICULTURE

Methane emissions from livestock manure in New York total nearly 6 million metric tons of CO2e,[8] which could be refined into 10.6 million MMBTUs of energy – or an amount of RNG fuel able to displace upwards of 70 million gallons of diesel or gasoline fuel.[9]

Energy Vision's research has found anaerobic digestion to be a successful strategy for capturing the methane from manure, particularly in dairy industries like New York's where current manure management typically involves storage "ponds" that emit large quantities of methane-rich biogas, especially in the summer. Section AF9 of the Draft Scoping Plan uses the term "alternative manure management" frequently, while apparently avoiding the term "anaerobic digestion". As one of the primary forms of "alternative manure management" technology available today, AD deserves to be prominently supported in the final Scoping Plan.

The technology has many benefits. Use of digesters replaces the use of manure storage lagoons which emit odors and can leach contaminants into the groundwater. Processing dairy manure in ADs also allows for capture of methane-rich biogas, and upgrading of this biogas into RNG, which Argonne National Laboratory, the California Air Resources Board and the US EPA have all agreed has the lowest lifecycle "carbon intensity" of any fuel available today. Argonne National Laboratory and CARB have

[7] NYC Environmental Justice Alliance, "CAMP-EJ," NYC EJA, 2021, https://nyc-eja.org/wp-content/uploads/2021/02/CAMP-EJ-2020-Report-Final-021821-Reduced.pdf

[8] NYS GHG Inventory, 2021.

[9] NYSERDA/ICF, "Potential of Renewable Natural Gas," average of "achievable deployment" and "optimistic growth".

both found that RNG made from dairy manure is significantly net-carbon-negative, meaning that *more GHGs are captured in producing the fuel than are emitted during its use*.

RNG fuel can be used to power farm equipment and heavy-duty vehicles, to heat buildings, or as an alternative to fossil natural gas used in various industrial applications.

In addition to the energy produced, nutrient-rich "digestates"—the organic materials left in the digesters after gas capture—can be recovered to produce valuable liquid and solid soil nutrients. Both are nearly odorless, pathogen-free and can take the place of synthetic fertilizers that are often produced using fossil natural gas. Liquid digestate retains all the nutrient content of the original manure but it is much more easily absorbed into the soil, so it provides better nutrition and is less likely to run off into neighboring water bodies. Solid digestate can also be used for animal bedding, saving farmers money.

In economic terms, construction of 400 or more small, medium and large scale anaerobic digesters on New York dairy farms with 300-or-more cows would generate more than $1 billion in economic activity. In addition, there is room for an entire industry to grow up around the blending and packaging of digestate into readily saleable bedding and nutrient products.

As raised in Chapter 15, leak detection and repair should be an absolute priority for *all* anaerobic digesters. However, to suggest that digesters are on balance a *source* of methane emissions is inaccurate. While not all digesters are created equal, and some are certainly more efficient and effective than others, compared to the "baseline" or current industry standard (lagoons), *all* digesters achieve net-reductions in fugitive methane emissions.

Energy Vision strongly supports the following recommendations included in the DSP (Section AF9) and encourages the CAC to include them as proven methane mitigation strategies/technologies in the final Scoping Plan:

- Expand funding to assist farmers with alternative manure management and methane reduction.

- Expand access for all farmers to technical and financial assistance offered by the Department of Agriculture and Markets (AGM) and the Soil and Water Conservation Committee (SWCC).

- Refine AGM and SWCC grant policies to incorporate methane mitigation in funding for manure management systems.

- Expand the capacity of Soil and Water Conservation Districts (SWCDs) to support on-farm emissions reductions.

- Increase AGM's technical support capacity for alternative manure management systems (AMMS) in all stages of the project cycle.

- Develop a State-funded AGM loan guarantee program to stimulate investment in AMMS.

- Develop bulk buying programs for AGM and SWCC with respect to AMMS material, equipment and components to reduce farmer costs

- Increase NYSERDA and AGM funding to advance energy production and methane mitigation, and develop standards for methane leak monitoring, detection and repair.

- AGM and NYSERDA should align manure management systems designed for energy production, organic waste management, and methane mitigation with existing and future markets and private-sector investment, and improve connections between farms with AMMS and other businesses.

- Provide long-term funding for applied research and outreach through AGM, including on new processes and technologies, GHG/methane leakage detection and quantification, processes for realizing additional value from manure, and strategic development/siting of manure and organic waste management systems.

Additional Energy Vision comments:

1) **Cover and flare systems** are included as an alternative manure management practice (page 209). Our research indicates that such systems should be limited to farms where anaerobic digestion is not an option. Flaring biogas without extracting energy for beneficial use just puts CO_2 and other pollutants into the atmosphere. It is a missed opportunity to produce renewable energy and valuable agricultural nutrients when New York needs to reduce its GHGs, expand its mix of renewable energy and fuel sources and reduce its reliance on synthetic fertilizers.

2) **Encourage R&D around reducing enteric fermentation (cow burps/flatulence) through improved diet.** This strategy, supported also by the Climate Justice Working Group (CJWG; page 210), could have a significant positive impact on reducing methane emissions. There is significant ongoing research in this area being pursued by UC Davis, Cornell and other leading agricultural institutions with promising initial results.

   Further to the CJWG's stated preference for manure management strategies "that reduce animal waste generation at its source" (page 210), we are unaware of any proven technologies at present that make cows defecate less.

3) **Consider the economic implications the Final Scoping Plan may have on New York's dairy sector, one of NY's premier rural industries**. Page 210 references the CJWG's stated preference for "imposing regulations on dairy and other livestock farmers to reduce emissions" (p. 210). Apparently the only instance of the CJWG calling for industry regulation, this seems to reflect the disdain voiced by some advocacy and environmental justice groups for "factory farms", i.e. concentrated animal feeding operations or "CAFOs". While such regulation may be appropriate in the future, first, New York's research of manure management programs and policies should be accompanied by technical and financial resources to support emissions reductions, particularly for small farmers. This has been the model in California, where dairy methane emission reductions have been a core policy as part of the State's broader commitment to reducing "short-lived climate pollutants" 40% by 2030.

   It should be noted that NYS DEC defines any dairy farm with more than 300 cows as a CAFO. This means that almost 500 NY dairies—most of them multi-generational family farms, accounting for two-thirds of the state's dairy herd—could be classified as "factory farms." Hopefully it is a State priority **not** to put these farms out of business by making it prohibitively expensive or restrictive to operate in New York. The most likely consequence of simply imposing new regulations on them without supports may well be a mass exodus of dairy farmers to other jurisdictions, creating the kind of economic leakage that the DSP states it wants to avoid. We encourage DEC to strongly consider the economic implications the Final Scoping Plan may have for New York's dairy farmers.

<u>TRANSPORTATION</u>

Energy Vision's comments on the Transportation section of the DSP focus on our recommendation that the final Plan give unequivocal support to a Clean Fuel Standard, based on its success in other states.

What happens in the transportation sector is critically important since, according to New York's most recent GHG Inventory, it contributes 20% of the total statewide emissions -- over 75 million metric tons

of CO2 equivalent (CO2e). These emissions come primarily from the roughly 11.3 million on-highway vehicles registered in the state. In 2019 (the most recent pre-pandemic year) these vehicles, based on US EIA data, burned 5.5 billion gallons of gasoline and 1.3 billion gallons of diesel fuel.

Because electric vehicles have no tailpipe, and because electric motors are considerably more efficient in converting fuel into energy than internal combustion engines, the electrification of *everything*, including transportation, is seen by some environmental advocates as a panacea. But the state's goals are extremely ambitious and an "electrify everything" approach, according to Energy Vision's research will not enable the State to meet these goals.

New York currently has approximately 103,000 electric vehicles that would qualify as "zero emission vehicles" (ZEVs; 0.91% of the total).[10] It aims to have approximately 3 million by 2030, and 10 million by 2050. It aims for nearly 100% light-duty ZEV sales by 2030. And while the technology for these vehicles has proven commercially viable, significant challenges exist to achieving these goals: the need for rare earth and other minerals largely available from the Democratic Republic of the Congo and China that will be difficult to secure in the quantities required; their mining and processing in the US will face strong environmental opposition; and the building of sufficient charging infrastructure will be both challenging and costly.

For the medium- and heavy-duty (MHD) vehicle sectors, the challenges are much greater. The plan's goal is to have public MHD fleets converted entirely to ZEVs by 2040, "where technically feasible," and all new MHD vehicles to be zero-emissions by 2045. Strategies proposed to support this goal aim for 50% ZEV sales of medium-duty vehicles by 2030, and 80% ZEV sales of heavy-duty vehicles by 2035. To achieve this transformation, the DSP calls for "ZEV sales requirements, for "accompanying incentives and investments," and "potentially a clean fuel standard." Unlike the light-duty sector, the technology for heavy-duty electric vehicles is not commercial today. The much heavier batteries required are causing significant non-combustion particulate pollution, and the costs for the few available trucks are 2 to 3 times higher than for diesels. On the positive side, another technology exists – economically viable - for the heavy-duty sector that now is way out front in performance and in cutting greenhouse gases: the use of commercially-available natural gas engines using RNG.

Based on Energy Vision's extensive research, a clean fuel standard (CFS) is the single most important "incentive and investment" structure available to the state for hastening the adoption of non-petroleum electric and other zero- and low-emissions vehicles.

The use of this strategy has proven effective in the states where it has been implemented. Consider the following:

- This approach is modelled after programs adopted many years ago in California and Oregon (as well as British Columbia) which have successfully driven the production and use of low-carbon fuels in transportation– including a rapidly growing share of renewable electricity for electric vehicles. In California, the use of electricity as a transportation fuel has grown 200-fold since the introduction of that state's low carbon fuel standard in 2011.

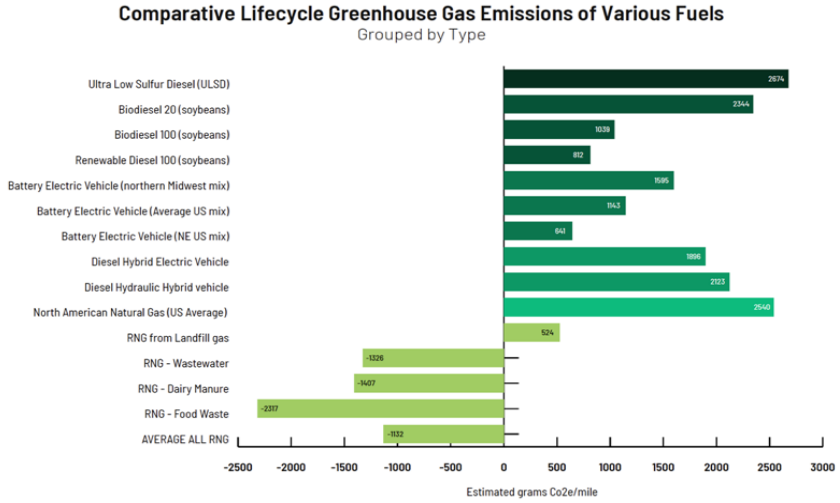
- A CFS requires no government funding beyond covering the administrative costs of the program. California's program has generated over $2 billion in support for low- and no-carbon fuels and infrastructure per year, and more than $1 billion for electrification alone just since 2019.

- A CFS has emerged as a proven approach to achieve New York's ambitious goal of a 20% reduction in transportation emissions in the next decade—representing the elimination of over 1 billion

[10] 103,000 vehicles, Atlas Public Policy, "EValuateNY," https://atlaspolicy.com/evaluateny/, March 2022. EValuateNY was created with support and funding from NYSERDA.

gallons of petroleum per year. NRDC, NYLCV, American Lung Association, Energy Vision and clean transportation fuel and vehicle providers all support its introduction in New York.

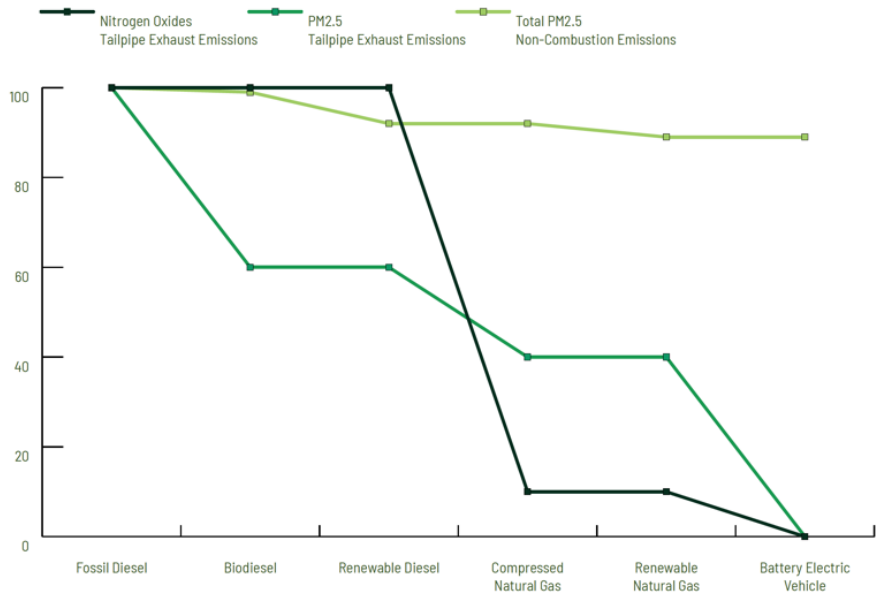
A Clean Fuel Standard is ***rooted in lifecycle carbon accounting (LCA), the gold standard for the IPCC, US EPA and Department of Energy, and the corporate focused Science Based Targets Initiative.*** *Using lifecycle carbon accounting, RNG derived from organic wastes delivers some of the greatest emissions reductions; RNG made from dairy manure is by far the lowest carbon fuel (see chart below, based on Argonne national Laboratory's "GREET" tool), underscoring the benefits of addressing New York's dairy sector methane emissions.*



- ***If the primary objective of the CLCPA is to combat climate change, all fuels should be compared and assessed on a lifecycle basis in relation to a petroleum baseline*****.** Some environmental advocates object to any fuel that makes use of the existing fossil fuel infrastructure (including natural gas pipelines) and any fuel involving combustion, so they reject RNG and other biofuels. They call these technologies "false solutions"—a notion that is not rooted in data. And those who call low-carbon biofuels "counter to the spirit of the CLCPA" have apparently chosen to forget that one of the primary purposes of the Act is to combat climate change by reducing emissions.

- ***If the additional State goal is to reduce tailpipe emissions in disadvantaged communities, battery electric vehicles and RNG achieve the greatest reductions in health-damaging co-pollutant emissions****, namely nitrogen oxides (NOx) and particulate matter (PM).* The chart below highlights the comparative tailpipe emissions of diesel as compared to various non-petroleum alternatives in heavy-duty on-road applications, in addition to *total* PM, including non-combustion emissions from brake and tire wear.

CHART 2: Emissions from Alternative Fuels as a Percentage of Average Ultra-Low-Sulfur Diesel Exhaust (Source: ANL GREET 2020)



New York cannot simply wait for electrification or fuel cells as aging urban fleets continue to use high-carbon, polluting diesel fuel. The DSP recognizes that electrification and other zero-emissions options are today limited for the medium-heavy-duty (MHD) and heavy-heavy-duty (HHD) vehicle sectors, reflected in the use of the qualifier "where technically feasible" (page 106). There remains considerable debate about when ZEVs will be available in these vehicle classes. Putting all of our cards into one technology basket – and one that is not yet commercial – is not a blueprint for success.

A clean fuel standard is technology agnostic, and will support the adoption of the fuels that offer the greatest GHG emission reductions at the lowest cost. It will support both vehicle electrification and the low- and no-carbon fuels we need to transportation sector-wide decarbonization. For all of these reasons, we strongly encourage the CAC to include a Clean Fuel Standard in the final Scoping Plan.