This will ensure that strategies address equity in the agricultural sector by prioritizing the use of on-site biogas over strategies that use Anaerobic Digesters for biogas or biomass for energy to mitigate GHG emissions on farms, eliminating synthetic fertilizers and encourage organic farming and ensuring that strategies include regulatory or mandatory actions and rely less on voluntary programs.

Anaerobic digesters break down organic wastes using bacteria that produce methane, which can be collected and combusted to generate electricity. Digesters also reduce odors and pathogens that are common with manure storage and the digested manure can be used as a fertilizer. There are relatively few digesters in the U.S., mainly due to high capital costs. Agriculture accounts for 6% of greenhouse gas emissions in the United States. Manure stored in anaerobic pits or lagoons supports environmental conditions for methane-producing bacteria, and these emissions account for 0.8% of U.S. emissions (26% of agricultural methane emissions and 9% of CO2e emissions from agriculture). Diverting manure away from traditional management techniques to Ads can have multiple benefits. First, biogas, which is a mixture of methane, carbon dioxide, and trace gases such as hydrogen sulfide, can be combusted on-site in a generator. The electricity produced may offset the purchasing power to be fed to the electricity grid. Alternatively, biogas can undergo an upgrading process that results in almost pure stream of methane that can be injected into natural gas pipelines. Energy generated by digesters can attract low-carbon energy subsidies if life-cycle emissions are considered. Second, digested manure that remains after the AD process can be separated into solids that may be used for soil amendment or replacement for livestock bedding, and liquid that can be used as fertilizer. The process mineralizes nutrients, leading to improved crop uptake and increased crop yields.

According to the AEM Planning sector of the Scoping Plan, they developed specific mitigation strategies for each farm. They included performance-based funding; this means building performance measures to access public funds and to monitor and implement new GHG mitigation practices. In addition, increasing adoption of cover and flare systems for existing manure storage and tracking performance of GHG reductions and completed projects. Also, having more public and private sector investments, and more private sector engineering, technology, operation, and verification support. Furthermore, having mitigation services for other sectors. Overall, this has to be a dairy farmer-led industry to prioritize net-zero GHG.

First, Performance-based funding includes federal agencies and state governments spending millions on anaerobic digesters to wring renewable energy from animal manure. The New York State Energy Research and Development Authority (NYSERDA) announced $16 million in funding for new and existing on-farm anaerobic digesters, an additional windfall for a sector that has already received more than $26 million from the agency. It’s a big investment but NYSERDA is just one government agency bankrolling the digester industry: a database of renewable energy policies and programs across the country lists 96 financial incentives for anaerobic digesters including property tax reductions, corporate tax credits, loan programs, grant programs, and performance-based incentives. Digesters are expensive: expensive to build and maintain. They can sometimes generate enough energy to power an entire farm, reducing one big bill and offsetting the cost of the digester, but the excess energy isn’t usually so excessive that selling it back to the grid nets the farm significant profits. Without outside funding, it simply doesn’t make financial sense for most farms to build or operate a digester. Anaerobic Digesters remain an uncommon manure management practice in the dairy industry mainly due to economic challenges. In addition to the significant capital cost of the digester, hiring additional staff to operate and maintain the AD system and meeting regulatory or permitting requirements may also be costly. Dairy farmers typically have narrow profit margins, which means they have less capital to invest in practices beyond what is needed for the farm to function. A farmer may be aware of the benefits of AD, but if the cost is perceived to outweigh those benefits, there is limited incentive to pursue AD. Benefits such as environmental stewardship, odor reduction, and emission reductions are difficult to monetize, and revenue from renewable electricity generation, although a potential source of direct income for a farm with an AD system, is often not high enough to make up the deficit. Furthermore, low electricity rates have made it increasingly difficult for power generation projects to remain profitable.

Moreover, the USDA is offering funding to help farmers turn manure into energy. USDA offers several programs that can help with the cost of an anaerobic digester, including the new Conservation Loan program, the Rural Energy for American Program, the Value-Added Producer Grant, and the Environmental Quality Incentives Program. The Conservation Loan Program guarantees loans to promote conservation practices on farms and ranches that help protect natural resources throughout the USA. FSA’s Conservation Loans are available to both smaller and less financially established farmers and ranchers and to larger and financially stronger farmers and ranchers. The family farm and test for credit requirements do not apply to Conservation Loans. FSA guarantees Conservation Loans with loan limits up to $1,750,000. Implementing conservation practices approved by the USDA’s Natural Resources Conservation Service, such as: reducing soil erosion, improving water quality; and promoting sustainable and organic agricultural practices. The Rural Energy for American Program provides guaranteed loan financing and grant funding to agricultural producers and rural small businesses for renewable energy systems to make energy efficiency improvements. Agricultural produces may also apply for new energy-efficient equipment and new system loans for agricultural production and processing. The Value-Added Producer Grant (VAPG) program helps agricultural producers enter into value-added activities related to the processing and marketing of new products. The goals of this program are to generate new products, create and expand marketing opportunities and increase producer income. The maximum funding you can receive is $75,000 for planning grants and $250,000 for working capital grants. The Environmental Quality Incentives Program (EQIP) provides financial and technical assistance to agricultural producers and non-industrial forest managers to address natural resource concerns and deliver environmental benefits such as improved water and air quality, conserved ground and surface water, increased soil health, and reduced soil erosion and sedimentation, improved or created wildlife habitat, and mitigation against drought and increasing weather volatility.

The storage of manure is an important practice to facilitate nutrient management, reduce the need for synthetic fertilizers, and prevent runoff for the improvement of water quality. However, the treatment and storage of livestock manure can produce methane through the anaerobic decomposition of the manure. Manure storage have caused the single highest increase in agricultural emissions from the 1990 baseline year to today. Mitigation of this source of emissions ranges from technically feasible to challenging depending on the use of available strategies and technologies or through more innovative and advanced manure management system approaches.

 Overall, I believe the implementation of anaerobic digesters would be a success in decreasing greenhouse gas emissions and reducing the mitigation of methane to the atmosphere. The results demonstrate the potential for climate policy to hasten the use of Ads, both to reduce GHG emissions from livestock and to produce renewable energy. There is an opportunity for a scenario where everyone gets what they want, by providing incentives to farmers for the GHG benefits of digester operation, there are additional nonmarket benefits, even though they were not explicitly incentivized and may increase with the increase in adoption rates of anaerobic digesters. I do not fail to recognize capital costs are a major barrier to the implementation of AD, there are opportunities to improve the efficiency of manure collection, processing, and subsequent biogas combustion that would increase the economic competitiveness of the technology. With over 30 dairies in New York already using anaerobic digesters, the state already has a great kickstart on increasing the number of digesters and reaching zero net emission by 2050 and creating clean renewable energy.