

Truck Platooning Stakeholder Workshops and Demonstration Planning



Final Report | Report Number 19-18 | May 2019



NYSERDA

**Department of
Transportation**

Truck Platooning Stakeholder Workshops and Demonstration Planning

Final Report

Prepared for:

New York State Energy Research and Development Authority

Albany, NY

Robyn Marquis, PhD
Project Manager, Clean Transportation

and

New York State Department of Transportation

Albany, NY

Chris Scharl, Operations and Asset Management Division

David Rosenberg, Policy and Planning Division

Prepared by:

Energetics

Clinton, NY

Paul Windover, Engineer
Russell Owens, PE, PMP, Technical Team Lead
Bryan Roy, PMP, Principal Engineer

Notice

This report was prepared by Energetics (hereafter the “Contractor”) in the course of performing work contracted for and sponsored by the New York State Energy Research and Development Authority (NYSERDA) and the New York State Department of Transportation (hereafter the “Sponsors”). The opinions expressed in this report do not necessarily reflect those of the Sponsors or the State of New York, and reference to any specific product, service, process, or method does not constitute an implied or expressed recommendation or endorsement of it. Further, the Sponsors, the State of New York, and the Contractor make no warranties or representations, expressed or implied, as to the fitness for particular purpose or merchantability of any product, apparatus, or service, or the usefulness, completeness, or accuracy of any processes, methods, or other information contained, described, disclosed, or referred to in this report. The Sponsors, the State of New York, and the Contractor make no representation that the use of any product, apparatus, process, method, or other information will not infringe privately owned rights and will assume no liability for any loss, injury, or damage resulting from, or occurring in connection with, the use of information contained, described, disclosed, or referred to in this report.

NYSERDA makes every effort to provide accurate information about copyright owners and related matters in the reports we publish. Contractors are responsible for determining and satisfying copyright or other use restrictions regarding the content of the reports that they write, in compliance with NYSERDA’s policies and federal law. If you are the copyright owner and believe a NYSERDA report has not properly attributed your work to you or has used it without permission, please email print@nyserda.ny.gov.

Information contained in this document, such as web page addresses, are current at the time of publication.

New York State Department of Transportation Disclaimer

This report was funded in part through grant(s) from the Federal Highway Administration, United States Department of Transportation, under the State Planning and Research Program, Section 505 of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the United States Department of Transportation, the Federal Highway Administration, or the New York State Department of Transportation. This report does not constitute a standard, specification, regulation, product endorsement, or an endorsement of manufacturers.

United States DOT Technical Report Documentation

1. Report No. C-17-02	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Truck Platooning Stakeholder Workshops and Demonstration Planning		5. Report Date: May 2019	
		6. Performing Organization Code	
7. Author(s) Paul Windover, Russell J. Owens, Bryan E. Roy		8. Performing Organization Report No. 19-18	
9. Performing Organization Name and Address Energetics, 3 Kirkland Ave., Suite 102, Clinton, NY 13323		10. Work Unit No.	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address NYS Department of Transportation, 50 Wolf Road, Albany, New York 12232		13. Type of Report and Period Covered Final Report, 2/2017 - 11/2018	
		14. Sponsoring Agency Code	
15. Supplementary Notes: Project funded in part with funds from the Federal Highway Administration			
16. Abstract <p>Heavy truck platooning has the potential to improve safety and reduce fuel consumption by up to 10%. Platooning has been successfully demonstrated by several developers in the U.S. This Phase II Truck Platooning follow-on project described had two purposes: (1) hold two stakeholder workshops including a broad range of stakeholders (e.g., trucking fleet operators and managers, State and local government agency representatives, transportation planners, transportation policy advisors, law enforcement, and other interested parties) to disseminate the Phase I project information and collect feedback regarding motivations for adopting platooning technology, barriers to adopting platooning, and questions about the technology and (2) perform preliminary planning for a potential New York State platooning demonstration. The key identified needs were (1) inter-fleet platooning is needed to enable widespread NYS trucking fleet adoption, (2) business case—potential cost reductions and business models need to be quantified and proven before fleets they will commit to platooning; including comparison of tandem trailers versus platooning, and (3) a system for identifying who is at fault when a crash occurs (driver or platooning system) is needed. The preliminary planning discussions for the truck platooning demonstration included: NYS Thruway Authority, NYS Department of Transportation, NYS Energy Research and Development Authority, NYS Police, NYS Department of Motor Vehicles/Governor's Traffic Safety Committee, Peloton Technology, Daimler Trucks North America, and Energetics. The discussions confirmed continued interest in platooning because of its potential positive safety and energy efficiency benefits. The NYS Thruway is the preferred roadway for initial demonstration/limited validation testing efforts. Video and/or documented test results of previous testing can meet many of the agencies' questions about how the systems react to regular and emergency conditions. However, some testing in NYS will be needed. The preferred demonstration scope is to hold a press event to showcase the technology to a broad audience, followed, post-event, with limited on-road testing to validate system functionality/failsafe performance and to answer NYS government agency and staff questions.</p>			
17. Key Words Platoon, platooning, truck automation, automated truck, cooperative adaptive cruise control, driver-assistive truck platooning, demonstration, stakeholder workshop		18. Distribution Statement No Restrictions	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages.30	22. Price

Form DOT F 1700.7 (8-72)

Abstract

“Platooning” is defined as two or more vehicles following each other in close proximity for the purpose of reduced aerodynamic drag and increased roadway throughput. Platooning is adaptable to all vehicle classes and types but is currently only being developed for heavy-duty (HD) trucks. A Phase I project prior to this study investigated platooning technology readiness for HD trucks; projected a commercialization timeframe; examined fleet knowledge of, interest in platooning technology and estimated a timeframe for such deployment; and considered the potential policy solutions to address barriers that will enable safe-truck platooning in New York State.

The Phase II Truck Platooning follow-on project described in this report had two purposes: (1) hold two stakeholder workshops and include a broad range of stakeholders (e.g., trucking fleet operators and managers, State and local government agency representatives, transportation planners, transportation policy advisors, law enforcement, and other interested parties) to disseminate the Phase I project information and collect feedback regarding motivations for adopting platooning technology, barriers to adopting platooning, and questions about platooning and (2) perform preliminary planning for a potential New York State platooning demonstration.

The key action items identified at the two workshops are as follows:

- **Fleet Interoperability, Logistics, and Routing**—Inter-fleet platooning is needed to enable widespread NYS trucking fleet adoption.
- **Safety and Certification**—Long Combination Vehicles (LCV)/Tandem Vehicles (i.e., trailers) require certification for use on the NYS Thruway. There is a need to determine what the vehicle certification requirements for platooning trucks will be to ensure they are functioning properly. There is also a need to determine who would certify platooning trucks.
- **Driver Factors and Crashes**—Identification of who is at fault if or when a crash occurs (driver or platooning system) will be needed. Drivers need to be assured that they are not to blame for following too close if the platooning system was engaged and in control of the platoon.
- **Benefits and Business Case**—The NYS trucking fleets that interacted with the project see fuel savings as the only quantifiable financial benefit. NYS fleets, especially typical mid-size and small fleets, need to see an economic evaluation that shows a positive return on investment to justify platooning. The payback period needs to be one and a half to two years following conventional logic. However, many large fleets are now requiring a payback period of one to one and a half years because of faster truck turnover schedules. Potential cost reductions and business models need to be quantified and proven before fleets will commit to platooning technology.

- **Special Case of LCV/Tandem Vehicles versus Platooning on the NYS Thruway**—The operational cost comparison of platooning trucks and LCV/Tandem Vehicles operation must be determined, proven, and shared.

Preliminary planning discussions for truck platooning demonstrations were held in parallel to, and informed by, the stakeholder workshops. The purpose of the discussions was to determine: (1) the technical performance requirements for platooning systems and (2) the NYS authorization and approvals needed to conduct a platooning demonstration on public roads in NYS. The planning discussions regarding preliminary truck platooning demonstrations included the following organizations: New York State Thruway Authority (NYSTA), New York State Department of Transportation (NYSDOT), New York State Energy Research and Development Authority (NYSERDA), New York State Police, New York State Department of Motor Vehicles/Governor’s Traffic Safety Committee, Peloton Technology (Peloton), Daimler Trucks North America, and Energetics. Highlights of the discussion results are as follows:

- The NYS agencies involved in the discussions are interested in platooning because of its potential positive safety and energy efficiency benefits for NYS.
- Peloton is focused on supporting freight truck platooning fleets nationwide. The company’s commercialization rollout plan is prioritized based on states that allow platooning and other factors. Prior to the project discussions, NYS’s near-term potential was viewed as low priority because of the uncertain platooning approval process and timelines. Comments were made that no legislation is preventing the use of low automation level (i.e., Level 1 and Level 2) platooning. The topic of an administrative approval pathway (potentially with a permitting program), in lieu of legislation for truck platooning’s use on certain NYS limited access highways (e.g., NYS Thruway and Interstate highways) was discussed briefly. Further study and discussions, that are outside of the scope of this project, are needed to determine if this is a feasible approach. To aid law enforcement in easily identifying whether platooning trucks are driving at a safe distance from each other, commercial use of platooning may need requirements or legislation that defines how trucks must display whether or not they are actively platooning.
- Peloton suggested that the State consider allowing platooning on suitable sections of both the NYS Thruway and Interstate highways to maximize the potential for NYS and out-of-state freight fleets that use NYS highways to realize the safety improvements and energy consumption benefits.
- There was interest from the NYS agencies, Peloton Technology (pending approval of NYS truck platooning), and Energetics to develop and hold a NYS platooning demonstration.
- The preferred demonstration scope type preferred by the NYS agencies, Peloton Technology, and Energetics is to include a press event to showcase the technology to a broad audience. Follow-up, post-event (same day or next day[s]), with limited testing to validate system functionality and failsafe performance would be conducted to answer NYS government agency and staff questions.
- Because of this broader purpose, the current NYS Automated Vehicle Test Program does not seem to be the best path for developing and implementing a truck platooning demonstration.

- The NYS Thruway is the preferred roadway for initial demonstration/limited validation testing efforts.
- Video and/or documented test results can be used for test conditions that have previously been tested to meet the agencies' (NYSTA and NYSDOT) need in understanding how systems react to regular and emergency conditions. The videos may reduce the amount of in-State testing.
- NYS agencies expect some future physical testing, including target limited testing to be done on a controlled rural section of the NYS Thruway.
- NYSTA prefers a platooning participant program (similar to the current LCV/Tandem Vehicles program) to provide a clear communication and control channel to the involved fleets.

The findings from the NYS platooning stakeholder workshop and the preliminary demonstration planning discussions summarized above indicate that continuing to pursue a truck platooning demonstration in NYS is warranted. The ability to secure Peloton's (currently the only platooning system developer with near-term commercialization plans) commitment to support a demonstration relies on platooning's commercial deployment potential in NYS. Peloton's decision to commit relies on fleets' ability to legally platoon in NYS. The preliminary planning discussions determined that a demonstration should include a press event for information dissemination and outreach as well as limited testing to answer remaining NYS agency questions and to validate system functionality and failsafe performance.

Keywords

Platoon, platooning, truck automation, automated truck, cooperative adaptive cruise control, driver-assistive truck platooning, demonstration

Acknowledgements

The authors gratefully acknowledge sponsorship of this project by the New York State Energy Research and Development Authority (NYSERDA) and the New York State Department of Transportation (NYSDOT). We appreciate the guidance provided by Robyn Marquis of NYSEDA and Chris Scharl and David Rosenberg of NYSDOT. The success of this study was greatly improved by the information and feedback provided by staff from: Peloton Technology, Trucking Association of New York, Buffalo Niagara Partnership, and trucking industry stakeholders who participated in the stakeholder workshops. The success of the stakeholder workshops was also improved by support from the Niagara International Transportation Technology Coalition staff.

Table of Contents

Notice.....	ii
New York State Department of Transportation Disclaimer	ii
U.S. DOT Technical Report Documentation	iii
Abstract	iv
Keywords.....	vi
Acknowledgements	vi
Executive Summary	ES-1
1 Truck Platooning Policy Study Project Summary	1
2 Truck Platooning Stakeholder Workshops	3
3 New York State Truck Platooning Demonstration Planning	10
4 Project Conclusion	18

Executive Summary

“Platooning” is defined as two or more vehicles following each other in close proximity for the purpose of reduced aerodynamic drag and increased roadway throughput. Platooning is adaptable to all vehicle classes and types but is currently being developed for heavy-duty (HD) trucks. A Phase I project prior to this study investigated platooning technology readiness for HD trucks; projected commercialization timeframe; examined fleet knowledge of, interest in technology, and estimated timeframe for deployment; and considered the potential policy solutions to address barriers that will enable safe-truck platooning in New York State.

The Phase II follow-on project described in this report had two purposes: (1) hold two stakeholder workshops to disseminate the Phase I project information and collect feedback regarding motivations for adopting platooning technology, barriers to adopting platooning, and questions about platooning and (2) perform preliminary planning for a potential New York State platooning demonstration.

Energetics developed and held two workshops titled Stakeholder Workshop to Advance Truck Platooning in New York State, one in eastern New York (Saratoga Springs) and one in western New York (Buffalo). The two workshops and locations were intended to provide more convenient access for participants and to increase participation. Planning and logistics support were provided by The Trucking Association of New York (TANY) (both workshops) and the Buffalo Niagara Partnership (western NYS workshop). The workshop invitees included stakeholders that were likely interested in truck platooning, including (1) trucking fleet operators and managers, (2) State and local government agency representatives, (3) transportation planners, (4) transportation policy advisors, (5) law enforcement, and (6) other interested parties. Broad and varied participation was targeted to provide a deeper understanding of the viewpoints from the wide range of impacted stakeholders. The key action items identified at the two workshops are as follows:

- **Fleet Interoperability, Logistics, and Routing**—Inter-fleet platooning is needed to enable widespread NYS trucking fleet adoption.
- **Safety and Certification**—Long Combination Vehicles (LCV)/Tandem Vehicles (i.e., trailers) require certification for use on the NYS Thruway. There is a need to determine what the vehicle certification requirements for platooning trucks will be to ensure they are functioning properly. There is also a need to determine who would certify platooning trucks.

- **Driver Factors and Crashes**—Identification of who is at fault if or when a crash occurs (driver or platooning system) will be needed. Drivers need to be assured that they are not to blame for following too close if the platooning system was engaged and in control of the platoon.
- **Benefits and Business Case**—The NYS trucking fleets that interacted with the project see fuel savings as the only quantifiable financial benefit. NYS fleets, especially typical mid-size and small fleets, need to see an economic evaluation that shows a positive return on investment to justify platooning. The payback period needs to be one and a half to two years following conventional logic. However, many large fleets are now requiring a payback period of one to one and a half years because of faster truck turnover schedules. Potential cost reductions and business models need to be quantified and proven before fleets will commit to platooning technology.
 - **Special Case of LCV/Tandem Vehicles versus Platooning on the NYS Thruway**—The operational cost comparison of platooning trucks and LCV/Tandem Vehicles operation must be determined, proven, and shared.

Two NYS trucking fleets that participated in the workshops were interested in potentially participating in a follow-on field demonstration project if one resulted from this, or other, projects.

Preliminary planning discussions regarding a truck platooning demonstration were held parallel to, and informed by, the stakeholder workshops. The purpose of the preliminary planning was to determine: (1) the technical performance requirements for platooning systems and (2) the NYS authorization and approvals needed to conduct a platooning demonstration on public roads in NYS. The preliminary planning discussions for a truck platooning demonstration included the following organizations: New York State Thruway Authority (NYSTA), New York State Department of Transportation (NYSDOT), New York State Energy Research and Development Authority (NYSERDA), New York State Police, New York State Department of Motor Vehicles/Governor’s Traffic Safety Committee, Peloton Technology (Peloton), Daimler Trucks North America, and Energetics.

Two conference call meetings for preliminary planning were held, the first one in November 2017 and the second in September 2018. The group agreed that since low-level platooning (Level 1 and perhaps Level 2) is the only real near-term commercial potential for the most widespread use for truck automation, the planning effort should focus on this and not include higher levels of automation (platooning and individual trucks). Peloton supported both discussions in providing industry insight into the technology, previous testing and/or results, and insight into what information, testing, and results other states have requested and/or required. Highlights of the discussion results are as follows:

- The NYS agencies involved in the discussions (NYSTA, NYSDOT, New York State Police, and NYSEERDA) are interested in platooning because of its potential positive safety and energy efficiency benefits for NYS.
- Peloton is focused on supporting freight truck platooning fleets nationwide. The company's commercialization rollout plan is prioritized based on states that allow platooning and other factors. Prior to the project discussions, NYS's near-term potential was viewed as low priority because of the uncertain approval process and timelines. Comments were made that no legislation is preventing the use of low-automation level (i.e., Level 1 and Level 2) platooning. The topic of an administrative approval pathway (potentially with a permitting program), in lieu of legislation for truck platooning's use on certain NYS limited access highways (e.g., NYS Thruway and Interstate highways) was discussed briefly. Further study and discussions, that are outside of the scope of this project, are needed to determine if this is a feasible approach. To aid law enforcement in easily identifying whether platooning trucks are driving at a safe distance from each other, legislation defining how trucks must display that they are or are not actively platooning may be required.
- Peloton suggested that the State consider allowing platooning on suitable sections of both the NYS Thruway and Interstate highways to maximize the potential for NYS and out-of-state freight fleets that use NYS highways to realize the safety improvements and energy consumption benefits.
- There was interest from the NYS agencies, Peloton Technology (pending approval of NYS truck platooning), and Energetics to develop and hold a NYS platooning demonstration.
- The preferred demonstration scope type preferred by the NYS agencies, Peloton Technology, and Energetics is to include a press event to showcase the technology to a broad audience. Follow-up, post-event (same day/next day[s]), with limited testing to validate system functionality and failsafe performance would be conducted to answer NYS government agency and staff questions.
- Because of this broader purpose, the current NYS Automated Vehicle Test Program does not seem to be the best path for developing and implementing a truck platooning demonstration.
- The NYS Thruway is the preferred roadway for an initial demonstration and limited validation testing efforts.
- Video and/or documented test results can be used to meet the agencies' (NYSTA and NYSDOT) need to understand how systems react to regular and emergency conditions—and may reduce the amount of in-State testing.
- NYS agencies expect some future physical testing, including target limited testing to be done on a controlled rural section of the NYS Thruway.
- NYSTA prefers to have a platooning participant program (similar to the current LCV/Tandem Vehicles program) to provide a clear communication and control channel to the involved fleets

The findings from the NYS platooning stakeholder workshop and the preliminary planning discussions summarized above indicate that continuing to pursue a truck platooning demonstration in NYS are warranted. The ability to secure Peloton's (currently the only platooning system developer with near-term commercialization plans) commitment to support a demonstration relies on platooning's commercial deployment potential in NYS. Peloton's decision to commit relies on the fleets' ability to legally platoon in NYS. The preliminary planning discussions determined that a demonstration should include a press event for information dissemination and outreach as well as limited testing to answer remaining NYS agency questions and to validate system functionality and failsafe performance.

1 Truck Platooning Policy Study Project Summary

A previous Phase I project (Truck Platooning Policy Barriers Study), jointly funded by the New York State Energy Research and Development Authority (NYSERDA) and the New York State Department of Transportation (NYSDOT),¹ investigated heavy truck platooning technology readiness; projected commercialization timeframe; examined fleet knowledge of, and interest in, adopting platooning; provided an estimated timeframe for commercial deployment of the technology; and explored the potential policy solutions to address barriers to safe truck platooning in New York State (NYS). Data were collected via literature review and interviews with industry experts, including platooning technology developers, heavy truck manufacturers, third-party technology analysts, fleet end users, and NYS roadway operators. Some platooning system providers and truck manufacturers have stated that the technology will be ready for initial commercialization in 2018 or soon thereafter, but regulatory development will delay widespread deployment.

“Platooning” is defined as two or more vehicles following each other in close proximity for the purpose of reducing aerodynamic drag and increasing roadway throughput. Platooning is adaptable to all vehicle classes and types but is currently being developed for heavy-duty (HD) U.S. Department of Transportation Class 8/National Highway Traffic Safety Administration Class 9 tractor trailer trucks. Currently deployed driver-assist technologies, such as Adaptive Cruise Control, can allow for automated following but at relatively large distances because of safety concerns during emergency maneuvers. Communication between vehicles creates a Cooperative Adaptive Cruise Control logic that allows following vehicles to react almost instantaneously to the lead truck’s actions. This allows following distances to be reduced enough to realize meaningful benefits. The minimum technology requirements to allow platooning include longitudinal vehicle control (throttle and brake) and vehicle-to-vehicle (V2V) communication. In addition, some manufacturers suggest that lateral control (steering) is also required to realize the technology’s full potential. Heavy truck platooning has the potential to reduce fuel consumption by up to 10% while improving safety. Truck platooning has been successfully demonstrated on test vehicles by several developers in the U.S.

¹ Windover, P., R. Owens, and B. Roy, “Truck Platooning Policy Barriers Study”, Report Number 18-01, January 2018, <https://www.nyseda.ny.gov/-/media/Files/Publications/Research/Transportation/18-01-Truck-Platooning-Policy-Barriers.pdf>

The study determined that there are no specific federal policies or regulations that prohibit the use, operation, or deployment of platooning for light- or heavy-duty vehicles. One existing NYS law was identified that negatively impacts near-term, heavy-duty truck platooning use in NYS: the minimum following distance regulations including a “reasonable and prudent” following distance and the requirement to leave sufficient space for other vehicles to enter the space between them. One existing NYS law (NYS Vehicle and Traffic Law Article 33 § 1226) was identified that would negatively impact potential longer-term and higher automation level platooning: the requirement that a human operator must have at least one hand on the steering wheel at all times while a vehicle is operated. Potential policy solutions to these issues, as well as other suggested legislation (e.g., defining platooning and requiring fleets to apply for/be granted permission to operate platooning vehicles) were identified and described along with legislative wording and references to how other states have addressed these topics.

Phase I determined that many NYS fleets are interested in platooning but need more information on platooning technology and information to determine its real-world costs and benefits to their operations. Fuel cost reduction is the primary interest and adoption motivator for these fleets. Improved safety, drive fatigue, etc. are important but secondary incentives for which the payback and impact are more difficult to quantify at this stage. Phase I also determined that there was potential interest in a NYS truck platooning demonstration, however several key details including NYS agency partners, testing needs, NYS approvals, and industry partner commitment must be determined to plan for a potential NYS demonstration.

The Phase II follow-on project described in this report had two purposes: (1) hold two stakeholder workshops to disseminate information and collect feedback and (2) perform preliminary planning for a potential New York State platooning demonstration.

2 Truck Platooning Stakeholder Workshops

Energetics developed and held two workshops for the project titled Stakeholder Workshop to Advance Truck Platooning in New York State, one in eastern New York and one in Buffalo. The two workshops and their locations were intended to provide more convenient access for participants and thereby increase participation. The Trucking Association of New York (TANY) was a project partner that led the workshop logistics, participant registration, host site, equipment, and food.

The Workshop Plan, Workshop Marketing Collateral (i.e., participant invitation), and Proposed Attendee Lists (one per workshop), each a project deliverable, were developed by Energetics and TANY and shared with NYSERDA and NYSDOT for review, comment, and suggestions. Finalized versions of each addressed NYSERDA and NYSDOT's comments and suggestions.

The eastern NYS workshop was held on April 3, 2018 from 5:30 to 6:30 p.m. at the Saratoga Springs City Center, Saratoga Springs, NY. The workshop was hosted in conjunction with TANY's 2018 NYS Truck Safety and Education Symposium and Safety Exhibition and directly followed the TANY meeting. Co-locating the meeting was important to maximize attendance.

The western NYS workshop was held in conjunction with the Buffalo Niagara Partnership. TANY and the Niagara International Transportation Technology Coalition helped to facilitate the introduction to the Buffalo Niagara Partnership. The western NYS workshop was hosted by Buffalo Niagara Partnership at their facility on June 26, 2018 from 8:30 to 10:00 a.m. The workshop was hosted in conjunction with Buffalo Niagara Partnership's Logistics and Transportation Council.

The workshop invitees included stakeholders that are likely interested in truck platooning, including (1) trucking fleet operators and managers, (2) State and local government agency representatives, (3) transportation planners, (4) transportation policy advisors, (5) law enforcement, and (6) other interested parties. Broad and varied participation was targeted to provide a deeper understanding of the viewpoints from the wide range of impacted stakeholders.

The eastern NYS workshop invitees list included (1) all 2018 NYS Truck Safety and Education Symposium and Safety Exhibition attendees, (2) trucking fleets who were interviewed for the Phase I project that reside in eastern New York, (3) Clean Cities Coalition coordinators in eastern New York to distribute to their stakeholder lists that include Clean Communities of Central New York, Capital District Clean Communities, Empire Clean Cities, (4) Regional Transportation Planning Organizations to distribute to their stakeholders; Adirondack/Glen Falls Transportation Council and Capital District Transportation Committee, (5) New York State Police (including Commercial Vehicle Inspection Program staff), (6) New York Department of Motor Vehicles, (7) Governor's Traffic Safety Council, and (8) New York Department of Transportation.

The western NYS workshop invitees list included (1) Buffalo Niagara Partnership Logistics and Transportation Council members, (2) Buffalo Niagara Partnership Manufacturing Council members, (3) trucking fleets who were interviewed for the Phase I project that reside in western New York, (4) Clean Cities Coalition coordinators in eastern New York to distribute to their stakeholder lists; Clean Communities of Central New York, Greater Rochester Clean Cities, Clean Communities of Central New York, (5) Regional Transportation Planning Organizations to distribute to their stakeholders; Greater Buffalo-Niagara Regional Transportation Council, Genesee Transportation Council, (6) New York State Police (including Commercial Vehicle Inspection Program staff), (7) New York Department of Motor Vehicles, and (8) Governor's Traffic Safety Council, and (9) New York State Department of Transportation.

The workshops were designed in the following manner:

- Present information about platooning technology—how it relates to and differs from automated driving; platooning's benefits—how platooning may change or improve business operations; and provide summarized versions of policies that impact platooning.
- Provide an open forum to discuss stakeholders' (1) motivations for the adoption of platooning technology, (2) barriers to adoption of platooning, and (3) questions about platooning.

The agendas for both workshops were nearly identical, customized for the venue and schedule.

The following topics were discussed:

- Summary of truck platooning system (components, high-level functionality, etc.)
- Summary of known truck platooning commercialization
- Summary of truck platooning benefits in NYS, including how platooning may change, or improve, business operations
- Summary and discussion of candidate roadways, a summary of the NYS policy requirement outcomes from the Phase I study

- Discussion and capture of stakeholder platooning technology and deployment questions
- Discussion and capture of motivations for the adoption of platooning
- Discussion and capture of barriers to the use of platooning

The information presented at the western NYS workshop was augmented by videos of platooning trucks provided by project supporter and truck platooning system developer, Peloton Technology. The provided videos answered many questions from eastern NYS workshop participants regarding vehicle operation under normal and emergency situations.

The combined comments from stakeholder participants by topic area are provided below. The key action items resulting from the workshop discussions are located at the end of the topic areas section.

Logistics and Routing

- Most fleets that participated in the workshops operate regionally, not nationally.
- Several fleets said they see platooning benefitting long-haul fleets, but not regional-haul fleets, especially in the northeast that is much more congested.
- Attendees felt that long-haul fleets will benefit the most, but they also think regional fleets can be a good fit, depending on the routes (mileage and percentage of mileage on limited access highways).
- One NYS fleet stated it is interested in platooning because of the uncertain future of Long Combination Vehicles (LCV)/Tandem Vehicles (i.e., trailers) on the NYS Thruway in a few years when, according to the NYS fleet, toll booths will be replaced with automated tolling. Without toll booths safe places for LCV/Tandem Vehicles to pull off the highway, drop trailers, and safely get back on the road will be eliminated.
- Fleets will need to have more than two trucks on the road at the same time going the same direction.
 - Fleets will need to change their operations and/or use a platooning service provider to match routes with other fleets (inter-fleet platooning) to make platooning a feasible option and have the chance of being cost-effective, all of which is a difficult ask.
- The ideal world would have dedicated truckways, or dedicated truck lanes that were physically separated from light-duty vehicle traffic.

Fleet Interoperability

- How will this work for intra- and inter-service trucks?
- The need for different fleets to platoon together was brought up repeatedly.
 - Few local NYS fleets have multiple trucks taking the same route at the same time consistently.
 - Systems are needed to enable “meeting up” with other trucks on the highway to form platoons.

- There were questions and concerns that need to be solved regarding who would receive the savings and which truck leads and which truck follows.
- Standards may be required to ensure platooning and vehicle systems are compatible.
- One large national fleet stated (1) it will require inter-fleet cooperation with other fleets for the technology to be feasible due to the fleet's operational configurations and (2) the need for trust in other fleets and in the platooning technology itself.

Safety

- Is it possible to quantify the safety benefit?
- What is the feedback from insurance companies?
- Following distance (approximately 40 feet) concerns drivers, see potential for brake lag issues
- Personal cars cutting in-between platooning trucks pose issues and safety concerns.
- Concerns over cyber security and the possibility of the being hacked with cloud-based platooning technologies were discussed. However, as the focus is on low-level automation, near-term cyber security threats are minimal.
- Stopping distance variability between trucks poses potential safety issues.
 - Attendees noted that new identical trucks can experience stopping distance differences of ≥ 10 feet.
 - Heavier trucks would be required to lead a platoon.
 - However, empty trailers can occasionally have longer stopping distances due to tire lockup.
 - Different brake specifications and conditions could be problematic (brake wear, air in the brake lines, component condition, etc.).
- A mechanical failure could be very problematic for following vehicles.
- Certification—LCV/Tandem Vehicles require certification for use on the NYS Thruway. What will be the vehicle certification requirements for platooning trucks to ensure they are functioning properly? Who would certify platooning systems?
- How would the public and law enforcement identify platooning vehicles?
- Potential for “move over law” issues?
- Longer, “electronically coupled” platooning vehicles pose issues when changing lanes.
- Limited visibility for following trucks could be problematic.
- Collision mitigation was brought up as a potential issue. As an example, the lead truck swerves to avoid an unforeseen obstacle (deer, pedestrian, car, etc.), the follower truck(s) either (a) could try to follow the front truck but risks hitting vehicles alongside or (b) would continue straight and hit the obstacle.

Driver Factors

- Drivers may struggle to stay engaged during long travel with minimal vehicle control responsibility. The platooning system could potentially reduce driver readiness to take over vehicle control when needed.
- Drivers may struggle to accept reduced following distances.
 - Drivers are trained to leave room between other traffic at all times as the best safety practice.

- Drivers may find it difficult to trust the platooning system and may attempt to swerve in an emergency stop.
- Drivers that are comfortable with platooning's reduced following distances may inadvertently follow too closely when not platooning.
- The government or industry needs to determine a method to identify who is at fault if or when a crash occurs (driver versus platooning system). Drivers need to be assured that they are not to blame if the platooning system was engaged and in control of the platoon.
- One fleet stated that driver fatigue is already an issue. Increased driver fatigue is anticipated and may occur due to the long hours of inactivity with only the view of the back of the leading truck's trailer 40 feet away.

Benefits

- Business model must be proven to fleets.
- The operational cost comparison for LCV/Tandem Vehicles versus platooning trucks must be determined and proven.
- One fleet stated that the potential cost savings need to be fully confirmed before fleets will commit.
 - Uncertain if fuel savings alone will provide a return on investment considering the cost of the technology.
- Compared to LCV/Tandem Vehicles, platooning does not have as much fuel savings. Using an example route from Syracuse to Newburgh (rough approximate fuel volumes were estimated), the fuel use compared as follows.
 - Two single trucks—150 gallons total (75 gallons per truck)
 - LCV/Tandem Vehicles—88 gallons total (41% fuel savings plus one less driver)
 - Platooning trucks—approximately 140 gallons total (7% fuel savings)
- Insurance savings—is platooning an insurance-approved technology? Savings potential comes from reduced incidents, not directly from technology adoption.
- Over the last seven to eight years baseline truck costs have increased over \$30,000 due to emission control systems. Owners and operators must be very sure new technology can save them money before investing in any purchases.
- Assuming a three- to four-year truck life in the original vehicle purchasing fleet, a payback period of one and a half to two years is needed.
 - Many large fleets are moving to a reduced two- to three-year truck turnover schedule because the maintenance costs sharply increase after this time. So, the payback period for any new technology would have to be one to one and a half years because of faster truck turnover schedules.
- Most fleets do not see much potential benefits other than fuel savings.
- Fleets need to see an evaluation that shows a positive return on investment for mid-size and small fleets to justify an investment in platooning.

Other Potential Barriers

- Public acceptance will be key.
- New York State Police mentioned that additional licensing and training may be required, particularly for lead drivers. The requirements could be similar to LCV/Tandem Vehicles' licensing requirements.
- When “controlling a second vehicle” additional responsibility falls on the lead driver.
- Some participants noted that near-term technology is similar to advanced cruise control and additional limitations are not necessary.
- It was noted that automated vehicle technology may jump from low-level Level 1 systems to Level 4 and Level 5 highly-automated systems. If this occurs, highly-automated platooning with drivers is unlikely.
- Platooning system maintenance may create issues for fleet managers in the future.
 - Several workshop stakeholders referenced the current level of sensors on modern diesel engines and how the diesel mechanic workforce is decreasing and requiring continued education due to progressing technology.
- Logistics could be difficult. For example, one fleet noted that it stopped running LCV/Tandem Vehicles due to overly complicated logistics.
 - Delaying shipments to bundle multiple shipments together to enable using platooning.
 - Additional travel to get empty trailers to appropriate location.
- Uncertain vehicle resale value for platooning systems that are bought earlier, less advanced, and more expensive than new systems when the truck is sold. (For example, flat panel televisions were initially approximately \$4,000+, but are now are about \$400.)
- One large fleet's concerns and opinions:
 - Platooning systems are not ready for commercialization.
 - The fleet will do nonroad track testing first before on-road testing is done.
 - Platooning systems should be truck manufacturer-developed, so they are integrated into the vehicle.
 - If third-party solutions are used, they cannot be simple add-on or retrofit systems. Third-party systems must be very well-integrated into the baseline vehicle.

Potential Fleet Partners for a Follow-On Demonstration Project

Several NYS trucking fleets that participated in the workshops were potentially interested in participating in a follow-on field demonstration project if one resulted from this, or other, projects.

- Johnson Equipment Sales & Service, Inc., vehicle maintenance provider, and Leonard's Express, Inc., fleet operator (both owned by the same company) stated their potential interest in participating in a technology demonstration project was to experience and evaluate the technology. However, the companies will need to see a positive business case to adopt across their fleet in the long-term.

- Clinton’s Ditch Cooperative Co., Inc. stated the fleet is interested in testing platooning technology in a follow-on demonstration project but sees limitations if the fleet would need to split LCV/Tandem Vehicles operations and provide twice the number of trucks and drivers.
- Other fleets stated interest in potential participation but were not able to confirm interest.

Key Workshop Action Items

- **Fleet Interoperability, Logistics and Routing**—Inter-fleet platooning is needed to enable widespread NYS trucking fleet adoption.
- **Safety and Certification**—LCV/Tandem Vehicles require certification for use on the NYS Thruway. There is a need to determine what the vehicle certification requirements for platooning trucks will be to ensure they are functioning properly. There is also a need to determine who would certify platooning trucks.
- **Driver Factors**—Crashes require the identification of who is at fault if and when a crash occurs (driver or platooning system). Drivers need to be assured that they will not be blamed for following the lead truck too closely if the platooning system was engaged and in control of the platoon.
- **Benefits and Business Case**—The NYS trucking fleets that interacted with the project see fuel savings as the only quantifiable financial benefit. NYS fleets, especially typical mid-size and small fleets, need to see an economic evaluation that includes inter-fleet platooning and shows a positive return on investment to justify platooning. The payback period needs to be one and a half to two years following conventional logic. However, many large fleets are now requiring a payback period of one to one and a half years because of faster truck turnover schedules. Potential cost reductions and business models need to be quantified and proven to fleets before they will commit to platooning technology.
- **Special Case of LCV/Tandem Vehicles versus Platooning on the NYS Thruway**—The operational cost comparison of platooning trucks and LCV/Tandem Vehicles operation must be determined, proven, and shared.

3 New York State Truck Platooning Demonstration Planning

This section summarizes the results of preliminary planning discussions for a truck platooning demonstration held by the project to determine (1) the technical performance requirements for platooning systems and (2) the NYS authorization and approvals needed to conduct a platooning demonstration on public roads in NYS.²

The preliminary planning discussions for the truck platooning demonstration included the following organizations: (1) New York State Thruway Authority (NYSTA), (2) New York State Department of Transportation (NYSDOT), (3) New York State Energy Research and Development Authority (NYSERDA), (4) New York State Police, (5) New York State Department of Motor Vehicles/ Governor's Traffic Safety Committee, (6) Peloton Technology (Peloton), (7) Daimler Trucks North America, and (8) Energetics.

The planning discussions included all of the project partners (organizations and key staff) necessary, except a potential fleet partner, in the event a follow-on demonstration is pursued. However, the stakeholder workshops identified the following potential fleet partners: Johnson Equipment Sales & Service, Inc., vehicle maintenance provider, and Leonard's Express, Inc., fleet operator (both owned by the same company), as well as Clinton's Ditch Cooperative Co., Inc. The fleets were not included in the demonstration planning discussions since the focus was more on the mechanics of agency understanding the technology and determining the State's needs to validate the technology and the technology provider's needs to justify pursuing a demonstration.

Two preliminary conference call meetings were held, the first one in November 2017 and the second in September 2018. The group agreed that since low-level platooning (Level 1 and perhaps Level 2) are the only real near-term commercial potential for the most widespread use for truck automation, the planning effort should focus on these and not include higher levels of automation (platooning and individual trucks).

² The comprehensive demonstration planning, coordination, and execution of an on-road truck platooning demonstration are outside this project's scope.

Peloton supported both discussions to provide industry insight into the technology, previous testing, and results, as well as to provide insight into information, testing, and results other states have requested or required. Daimler Trucks North America (manufacturer of Freightliner Trucks) is developing an integrated system in-house and participated in the second call.

The first call identified knowledge gaps of the platooning system operation, the needs for physical testing in NYS (versus previous testing video and reports), and the NYS review and approval process. Peloton provided a detailed set of information and videos describing operation in both normal and emergency situations. The second, and final, call discussed the information Peloton provided, and to discuss the remaining topics to complete the preliminary truck platooning demonstration planning. A summary of the discussion, grouped by topic, is presented below. Highlights are provided following the detailed topic summary.

- **Platooning System Operation**

- NYS agency staff had questions regarding platooning systems' operation in normal and emergency situations, such as the following:
 - How the system handles one of the trucks (lead or follower) exiting the highway.
 - Voluntary (driver initiated) exiting from platoon (at any time).
 - If the lead truck moves to another lane for an emergency maneuver, does the truck automatically lose the electronic platoon tether?
 - How will the follower truck react if the lead truck rapidly changes lanes to avoid an object, or a crash in process? Will the follower truck decouple or follow the lead truck?
 - What happens when there is unexpected, sudden traffic and congestion, and stopped traffic from crashes, etc?
- Peloton is currently the only company pursuing near-term commercialization for heavy truck platooning. The company is well suited to the discussion and has its experience to offer suggestions.
- Peloton answered the group's questions and provided a detailed set of information and videos describing the platooning system operation in both normal and emergency situations. This information answered many of the questions raised by NYS staff.

- **Testing and Demonstration Location(s)**

- Peloton prefers to follow industry testing best practices to operate in traffic and react to naturalistic (naturally occurring) conditions, not introduced conditions.
- The group discussed testing the truck platooning system on relatively flatter and more rural sections of both the NYSTA-operated NYS Thruway and NYSDOT-operated interstate highways, between Buffalo and Albany in fair weather conditions.
- The group decided that the NYS Thruway was the ideal location for the first truck platooning demonstration in NYS.

- **Option 1**—NYS Thruway between Exits 35 and 39 (11 miles) could be a good option. This would allow for testing a certain operating condition in one direction. The trucks would exit the road and discuss results and potential test configuration change. The previous test case and an updated test could be to repeat or test the next test case travelling in the opposite direction.
- **Option 2**—Testing with partial lane closures on three-lane sections of the NYS Thruway (e.g., between Exit 45 (Rochester/Victor/I-490) and Exit 44 (Canandaigua/Victor/New York Route 332) if *done off-peak*. However, the distance between exits is only 3.86 miles, so it may not be long enough. Three lanes would allow for (1) an outer lane used for the platooning validation testing, (2) a middle lane for the control lane which would be State Police monitored, and (3) an inside lane for open traffic; or the opposite.
- Other options are possible but were not discussed.
- **Platooning Testing Needs**
 - Peloton is currently the only company pursuing near-term commercialization for heavy truck platooning. Peloton is initially commercializing two truck platoons. This simplifies the testing requirements.
 - Peloton stated it feels that previous test results (video and reports) should be used to minimize the physical testing requirements in NYS. The company also stated that physical testing should be focused on unique and necessary test cases that have not yet been performed. This will minimize the testing and demonstration duration and maximize the potential for Peloton to support a NYS demonstration.
 - Peloton has video recordings of most of its previous platooning testing, including (1) cut-ins, (2) lane change, (3) hard braking, (4) off-ramps, (5) platoon split off, (6) platoon engagement.
 - NYSTA and NYSDOT confirmed that videos of previous testing could be used to prove and understand many test conditions. This video documentation may reduce the amount of NYS testing, but NYSTA and NYSDOT anticipated that some NYS physical testing would still be required.
 - NYSTA and NYSDOT were not able to fully quantify the list of test condition results, at this stage, that would have to be evaluated in order to approve a demonstration on the NYS Thruway.
- **NYS Approvals**
 - NYSTA does not usually perform testing on the NYS Thruway but sees potential for platooning so would consider a platooning test and demonstration project.
 - The NYSTA Director would have to approve a testing and/or demonstration plan that was offered on the NYS Thruway.
 - Other NYS approvals may also be needed.
 - The issues related to approving the deployment of platooning on NYS roads are NYS government-level issues, not just NYSTA and NYSDOT. However, deployment is beyond the scope of the demonstration planning effort. Hopefully, these project discussions will help inform the State’s platooning deployment discussions.

- The NYSTA approval process and path from controlled testing to an on-road demonstration (controlled or uncontrolled):
 - The controlled testing data and results would be reviewed by NYSTA. If the testing results do not satisfy all NYSTA testing, additional information and/or testing will be needed in order to move toward approval.
 - NYSTA will need to develop an operational plan for the platooning trucks and the escort vehicles.
 - Operational plan process is used for special loads and LCVs/Tandem Vehicles using the NYS Thruway: (1) requires an application, (2) vehicles are inspected, (3) vehicles must follow the defined plan (routes, times, stops, etc.), and (4) drivers are specially trained, licensed, and keep records.
- **Legislation, Approvals, and Permitting**
 - The group discussed the current outlook for NYS Connected and Automated Vehicle legislation, if this would be required for truck platooning, and if so, would it allow for platooning, and what is the anticipated timeline?
 - It was mentioned that legislation may not be needed to allow for low-level automation (i.e., Level 1 and Level 2) since a human driver is always in every truck and is continually engaged in driving (i.e., a different situation than autonomously-driven vehicles). The topic of an administrative approval pathway (potentially with a permitting program), in lieu of legislation, for truck platooning's use on certain NYS limited access highways (e.g., NYS Thruway and Interstate highways) was discussed briefly. Further study and discussion, outside the scope of this project, are needed to determine if this is a feasible approach. If proven a viable pathway, the process timing could be shorter than if legislation were required. To aid law enforcement in easily identifying whether platooning trucks are driving at a safe distance from each other, legislation defining how trucks must display that they are or are not actively platooning may be required.
 - NYSTA suggested that a permitting process and program similar to the LCV/Tandem Vehicles program could be developed and implemented. NYSTA views the LCV/Tandem Vehicles program (NYSTA only) as more of a communication link between NYSTA and the LCV/Tandem Vehicles operators. It lets them know who is running LCV/Tandem Vehicles and provides a communication, interaction, and discussion pathway. This communication allows NYSTA to inform fleets about events, road construction, road closures, and other issues fleets need to know for LCV/Tandem Vehicles operation. A similar platooning program could be developed, perhaps requiring a participation fee, or not. This hypothetical program could be implemented for use on the NYS Thruway only, or for both NYSTA-operated NYS Thruway and NYSDOT operated Interstate highways. Similarly, NYSDOT suggested this type of program could be operated like an overweight and oversize waiver program (fee may or may not be required), perhaps using a system similar to the NYSDOT/NYSTA HOOCS (Highway Oversize/Overweight Credentialing System) permit application system could be used.

- The potential reason for, and role of, a permitting program was unclear because permitting (e.g., an overweight/oversize credentialing system) is typically used to allow an exemption from an enacted legislation. Since no legislative barriers exist, the need for a permitting program was not clear. NYSTA explained that it uses permitting programs to provide a communication and information link between NYSTA and the end-user fleets. So, a potential platooning permitting program’s purpose would really be “controlling” and not “permitting.” NYSTA’s goal would be to request, and require, cooperation for a communication channel, especially during emergencies and when certain conditions are present.
 - There are at least two platooning management concepts being developed: (1) local control and (2) central cloud-connected control service. Local control to determine when and where to platoon resides on the vehicle. Communicating with these fleets would require a communication path (e.g., a permitting and communication program). For the central cloud-connected control service approach, NYSTA indicated that communication and interaction with the central platooning management entity(s)—instead of involving the fleets and drivers individually—is an interesting concept but would require additional study for them to make a decision.
- **Peloton Commercial Justification for Supporting a NYS Platooning Demonstration**
 - As a commercial company, Peloton needs to focus efforts where there is commercial development potential. A Peloton-supported NYS demonstration would have to be connected with a commercial potential and approved internally. If platooning’s use was limited to the NYS Thruway it would limit platooning’s adoption and deployment in NYS.
 - The information that there could be an alternate and potentially quicker approval pathway (potentially with a permitting program) could accelerate Peloton’s commercialization focus on including NYS. Peloton suggested that the State consider allowing platooning on suitable sections of both the NYS Thruway and Interstate highways to maximize the potential for NYS and out-of-state freight fleets that use NYS highways to realize the safety improvements, and energy consumption benefits.
- **Demonstration Vehicle Availability**
 - Peloton receives a large number of partnership requests, so it can not commit to all projects.
 - Peloton’s decision to support demonstrations and other activities and to allocate the required hardware and staff relate to the potential impact on commercialization.
 - Thus, a shorter testing and demonstration timeframe has more potential for securing internal support.
- **Interest and Support for a NYS Platooning Demonstration**
 - NYSTA is always looking for options to improve safety, which makes platooning’s potential and the concept of a platooning demonstration on the NYS Thruway of particular interest for the State transportation agency.
 - New York State Police, NYSDOT, and NYSERDA were also supportive of platooning’s potential in regard to safety and energy consumption benefits.

- Approval of truck platooning in NYS could accelerate Peloton’s commercialization focus to include NYS. The company’s decision to support a demonstration would depend on the timing and scope of NYS approval for fleets to platoon.
- **Demonstration Purpose, Scope, and Timeframe**
 - A NYS platooning demonstration could be an opportunity for NYSTA and the State to show its support for new connected vehicle technology that has the potential to improve the State’s road safety and transportation energy use.
 - The demonstration length depends on the purpose.
 - **Shorter**—A press event and several hours of platooning demonstration to show and explain to officials how to showcase technology purpose, functionality, benefits.
 - **Longer**—Follow the press event with limited testing to validate system functionality and failsafe performance to answer questions from NYS government agency and staff and to show and explain platooning to NYS fleets.
 - If a longer demonstration was done, pulling local loads could be possible. Peloton’s system (control and communication) is installed only on the tractor, so Peloton system-equipped tractors could pull local load trailers. The trailers would have to meet Peloton’s requirements (e.g., antilock brakes and required and inspected for proper operation and safety). This arrangement would require Peloton to contract with both the vehicle owner and shipper.
 - **Hybrid (preferred approach)**—Includes a press event to showcase the technology to a broad audience. Follow-up, post-event (same day/next day[s]), with limited testing to validate system functionality and failsafe performance would be conducted to answer NYS government agency and staff questions.
 - The group agreed that the purpose of a NYS demonstration should be informational—to provide knowledge, experiences, and answers as well as to get the interest and support of the required stakeholders.
 - NYSERDA asked if the testing and demonstration results from one company’s system (e.g., Peloton’s) would be enough to verify all platooning implementations by all manufacturers. Or, would each platooning system developer have to demonstrate their platooning system to NYS agencies before being approved and allowed to function in the State. Or, would video and other test data analysis verification be sufficient for subsequent vehicles?
- **NYS Autonomous Vehicle Testing Program versus Multi-Agency Project**
 - The NYS Autonomous Vehicle Testing program (operated by NYS Department of Motor Vehicles and the New York State Police), which expires March 2019, was discussed as a potential. It was unclear if platooning was in scope of that program since a human-driver is in each vehicle and continuously engaged in the driving. A NYS platooning demonstration could perhaps be done through this program which potentially might avoid the required programs, approvals, etc. that were discussed earlier in this report.

- However, a platooning technology demonstration integrated with NYSTA, NYSDOT, New York State Police, NYSERDA, Trucking Association of New York, etc. would also include a public outreach event(s) with NYS government staff and potential end users to encourage a broader purpose than a company-operated research and development program.
- **Demonstration Fleet Partners**
 - Two Peloton corporate owned, or Peloton customer platooning hardware suite-installed, tractors would be required.
 - If a demonstration event and limited testing were done, the trailer owner and load being carried are not as relevant to demonstrating the technology, however the trailer equipment specifications are relevant.
 - If a longer-term demonstration were pursued, using a customer load could be pulled. Two potential fleet partner options were discussed: (1) NYS-housed fleet (e.g., Leonard's Express, Inc. or Clinton's Ditch Cooperative Co., Inc. discussed earlier) and (2) one of Peloton's initial deployment national fleets with NYS operations.
- **NYS Truck Platooning Initial Demonstration Planning Summary**
 - The NYS agencies involved in the discussions (NYSTA, NYSDOT, New York State Police, and NYSERDA) are interested in platooning because of its potential positive safety and energy efficiency benefits for NYS.
 - Peloton is focused on supporting freight truck platooning fleets nationwide. The company's commercialization rollout plan is prioritized based on states that allow platooning and other factors. Prior to the project discussions, NYS's near-term potential was viewed as low priority because of the uncertain approval process and timelines. Comments were made that no legislation is preventing the use of low-automation level (i.e., Level 1 and Level 2) platooning. The topic of an administrative approval pathway (potentially with a permitting program) in lieu of legislation for truck platooning's use on certain NYS limited access highways (e.g., NYS Thruway and Interstate highways) was discussed briefly. Further study and discussions, that are outside of the scope of this project, are needed to determine if this is a feasible approach. To aid law enforcement in easily identifying whether platooning trucks are driving at a safe distance from each other, legislation defining how trucks must display that they are or are not actively platooning may be required.
 - Peloton suggested that the State consider allowing platooning on suitable sections of both the NYS Thruway and Interstate highways to maximize the potential for NYS and out-of-state freight fleets that use NYS highways to realize the safety improvements and energy consumption benefits.
 - There was interest from the NYS agencies, Peloton Technology (pending approval of NYS truck platooning), and Energetics to develop and hold a NYS platooning demonstration.
 - The preferred demonstration scope type preferred by the NYS agencies, Peloton Technology, and Energetics is to include a press event to showcase the technology to a broad audience. Follow-up, post-event (same day/next day[s]), with limited testing to validate system functionality and failsafe performance would be conducted to answer NYS government agency and staff questions.

- Because of this broader purpose, the current NYS Automated Vehicle Test Program does not seem to be the best path for developing and implementing a truck platooning demonstration.
- The NYS Thruway is the preferred roadway for initial demonstration and limited validation testing efforts.
- Video and/or documented test results can be used to meet the agencies' (NYSTA and NYSDOT) need to understand how systems react to regular and emergency situations and conditions. These videos may reduce the amount of in-State testing.
- NYS agencies expect some physical testing will still be needed. Target limited testing to be done on a controlled rural section of the NYS Thruway.
- NYSTA prefers a platooning participant program (similar to the current LCV/Tandem Vehicles program) to provide a clear communication and control channel to the involved fleets.

4 Project Conclusion

This Phase II follow-on project had two purposes: (1) hold two stakeholder workshops to disseminate the Phase I project information and collect feedback regarding motivations for adopting platooning technology, barriers to adopting platooning, and questions about platooning and (2) perform preliminary planning for a potential New York State platooning demonstration.

The project scope did not include expanding on the Phase I project research of the potential energy consumption and greenhouse gas reduction of platooning in NYS. The per vehicle platoon energy savings are well documented, so the number of truck platooning miles is the key parameter used to estimate the energy and greenhouse gas reduction potential. The number of potential NYS roads that are ideally suited to platooning is currently restricted to limited access highways (e.g., the NYS Thruway and NYS's interstate highways). However, the platooned miles will depend on many factors including (1) legal approval to platoon, (2) trucking fleets (both NYS and out of state) that have operations suitable to platooning, (3) number of lane miles where platooning is allowed (ideally NYS Thruway and NYS's interstate highways to maximize the potential), (4) fleets' ability to achieve an acceptable return on investment for hardware and operations upgrade investments.

The findings from the NYS platooning stakeholder workshop and the preliminary demonstration planning discussions described in this report indicate that continuing to pursue the development and implementation of a truck platooning demonstration in NYS is warranted. The ability to secure Peloton's (currently the only platooning system developer with near-term commercialization plans) commitment to support a demonstration relies on platooning's NYS commercial deployment potential in NYS. Peloton's decision to commit relies on fleets' ability to legally platoon in NYS. The preliminary planning discussions determined that a demonstration should include a press event for information dissemination and outreach as well as limited testing to answer remaining NYS agency questions and to validate system functionality and failsafe performance.

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and support to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA professionals work to protect the environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York State since 1975.

To learn more about NYSERDA's programs and funding opportunities, visit nyserda.ny.gov or follow us on Twitter, Facebook, YouTube, or Instagram.

**New York State
Department of Transportation**

50 Wolf Road
Albany, NY 12232

telephone: 518-457-6195

dot.ny.gov

**New York State
Energy Research and
Development Authority**

17 Columbia Circle
Albany, NY 12203-6399

toll free: 866-NYSERDA
local: 518-862-1090
fax: 518-862-1091

info@nyserda.ny.gov
nyserda.ny.gov



NYSERDA
**Department of
Transportation**

State of New York

Andrew M. Cuomo, Governor

New York State Energy Research and Development Authority

Richard L. Kauffman, Chair | Alicia Barton, President and CEO

New York State Department of Transportation

Marie Therese Dominguez, Acting Commissioner