



University Transportation Research Center - Region 2

Final Report

A Conference on Last Mile Freight Delivery: Use of Cleaner Mobility Vehicles



Performing Organization: University Transportation Research Center
(UTRC), CCNY/CUNY

January 2014

Sponsors:
New York State Energy Research and Development
Authority (NYSERDA)
New York State Department of Transportation
(NYSDOT)

University Transportation Research Center - Region 2

The Region 2 University Transportation Research Center (UTRC) is one of ten original University Transportation Centers established in 1987 by the U.S. Congress. These Centers were established with the recognition that transportation plays a key role in the nation's economy and the quality of life of its citizens. University faculty members provide a critical link in resolving our national and regional transportation problems while training the professionals who address our transportation systems and their customers on a daily basis.

The UTRC was established in order to support research, education and the transfer of technology in the field of transportation. The theme of the Center is "Planning and Managing Regional Transportation Systems in a Changing World." Presently, under the direction of Dr. Camille Kamga, the UTRC represents USDOT Region II, including New York, New Jersey, Puerto Rico and the U.S. Virgin Islands. Functioning as a consortium of twelve major Universities throughout the region, UTRC is located at the CUNY Institute for Transportation Systems at The City College of New York, the lead institution of the consortium. The Center, through its consortium, an Agency-Industry Council and its Director and Staff, supports research, education, and technology transfer under its theme. UTRC's three main goals are:

Research

The research program objectives are (1) to develop a theme based transportation research program that is responsive to the needs of regional transportation organizations and stakeholders, and (2) to conduct that program in cooperation with the partners. The program includes both studies that are identified with research partners of projects targeted to the theme, and targeted, short-term projects. The program develops competitive proposals, which are evaluated to insure the most responsive UTRC team conducts the work. The research program is responsive to the UTRC theme: "Planning and Managing Regional Transportation Systems in a Changing World." The complex transportation system of transit and infrastructure, and the rapidly changing environment impacts the nation's largest city and metropolitan area. The New York/New Jersey Metropolitan has over 19 million people, 600,000 businesses and 9 million workers. The Region's intermodal and multimodal systems must serve all customers and stakeholders within the region and globally. Under the current grant, the new research projects and the ongoing research projects concentrate the program efforts on the categories of Transportation Systems Performance and Information Infrastructure to provide needed services to the New Jersey Department of Transportation, New York City Department of Transportation, New York Metropolitan Transportation Council, New York State Department of Transportation, and the New York State Energy and Research Development Authority and others, all while enhancing the center's theme.

Education and Workforce Development

The modern professional must combine the technical skills of engineering and planning with knowledge of economics, environmental science, management, finance, and law as well as negotiation skills, psychology and sociology. And, she/he must be computer literate, wired to the web, and knowledgeable about advances in information technology. UTRC's education and training efforts provide a multidisciplinary program of course work and experiential learning to train students and provide advanced training or retraining of practitioners to plan and manage regional transportation systems. UTRC must meet the need to educate the undergraduate and graduate student with a foundation of transportation fundamentals that allows for solving complex problems in a world much more dynamic than even a decade ago. Simultaneously, the demand for continuing education is growing – either because of professional license requirements or because the workplace demands it – and provides the opportunity to combine State of Practice education with tailored ways of delivering content.

Technology Transfer

UTRC's Technology Transfer Program goes beyond what might be considered "traditional" technology transfer activities. Its main objectives are (1) to increase the awareness and level of information concerning transportation issues facing Region 2; (2) to improve the knowledge base and approach to problem solving of the region's transportation workforce, from those operating the systems to those at the most senior level of managing the system; and by doing so, to improve the overall professional capability of the transportation workforce; (3) to stimulate discussion and debate concerning the integration of new technologies into our culture, our work and our transportation systems; (4) to provide the more traditional but extremely important job of disseminating research and project reports, studies, analysis and use of tools to the education, research and practicing community both nationally and internationally; and (5) to provide unbiased information and testimony to decision-makers concerning regional transportation issues consistent with the UTRC theme.

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A Conference on Last Mile Freight Delivery Use of Cleaner Mobility Vehicles

Final Report

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ABSTRACT

While population increases, so do the demand for products and the freight traffic to deliver them. The increase in truck traffic creates many negative effects including increased traffic congestion, illegal parking and resting, incessant idling, and greenhouse gas and local pollutants emissions. Recently, many initiatives have been promoted to address this problem.

The event presented cross-disciplinary perspectives on urban logistics using electric vehicles (EV) and other vehicles as a sustainable mobility transportation solution. Presentations at the event reflected various perspectives, as speakers represented the public and private sectors and academia, including public officials, community leaders, transit community members, academia, consultants and the interested public. The multi-disciplinary team was from the U.S. and Europe. The event provided a forum that gathered experts and sustainability advocates to focus on the actions that can be taken immediately to meet the environmental challenges and take advantage of the business opportunities presented by such dense city areas, namely with the use of small sized mobility solutions.

KEY WORDS

Freight, Conference, Tricycle, Electric Vehicle, Sustainability, Mobility, Transportation, Environmental, Zero-emission, Fuel, Last mile, City logistics

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Acronyms and Abbreviations

BESTUFS: Best Urban Freight Solutions

CALTRANS: California Department of Transportation

CMAQ: Congestion Mitigation Air Quality

EFVs: Electric Freight Vehicles

E.U.: European Union

EV: Electric Vehicles

FREVUE: Freight Electric Vehicles in Urban Europe

GHG: Greenhouse Gas Emissions

IDMEC-IST: Instituto de Engenharia Mecanica – Instituto Superior Tecnico

IFSTTAR: French institute of science and technology for transport, development and networks

MAMCA: Multi Actor Multi Criteria Analysis

MTA: Metropolitan Transportation Authority

NJDOT: New Jersey Department of Transportation

NYC: New York City

NYCDOT: New York City Department of Transportation

NYCTCC: New York Transportation Coordinating Committee

NYMTC: New York Metropolitan Transportation Council

NYSDOT: New York State Department of Transportation

NYSERDA: New York State Energy Research and Development Authority

NYU: New York University

OEM: Original Equipment Manufacturer

PANYNJ: Port Authority of New York & New Jersey

PDX: Portland International Airport

RPI: Rensselaer Polytechnic Institute

TNT: Track n Trace

UDCs: Urban Distribution Centers

UPS: United Parcel Service

U.S.: United States of America

UTRC: University Transportation Research Center – Region 2

VMT: Vehicle Miles Traveled

SUMMARY

The University Transportation Research Center (UTRC) and the Research Centre - Instituto de Engenharia Mecânica (IDMEC – IST), Lisbon, Portugal received funding from NYSERDA to organize a conference in New York City. The conference entitled “Last Mile Freight Delivery: Use of Cleaner Mobility Vehicles” was held on Friday, October 4th, 2013 at the Baruch College Conference Center in New York City. The purpose of the event was to present cross-disciplinary perspectives on the use of electric vehicles (EV) and other vehicles as a sustainable mobility transportation solution. Such wide perspective was attained through a multi-disciplinary team from the U.S. and Europe, organizing an event that reflected their specific and coordinated expertise. It also reflected on the variety of invited national and international speakers that presented ways to link and coordinate their perspectives from engineering, business models, city administration, suppliers and society as a whole. UTRC, in close collaboration with IDMEC-IST held a successful event targeting transportation experts from public and private sector, public officials and community leaders, transit community members, academia, consultants, and interested public. The conference addressed the key issues on the use of environmentally friendly vehicles in the last mile operations in the New York metropolitan region.

The transportation solutions discussed in the event are contributing to a more sustainable transportation system. Several alternatives were discussed, including implementation of EV on last mile operations, which focuses on the potential reduction of energy consumption and associated Green House Gas (GHG) emissions of the multi-modal transportation system. Those examples should help professionals and stakeholders to better understand potential of similar implementations within the New York Metropolitan region as well as challenges.

INTRODUCTION AND BACKGROUND

INTRODUCTION

The last mile freight delivery conference was organized by UTRC, in partnership with the Research Centre - (IDMEC – IST), Lisbon, Portugal. The conference was sponsored by the New York State Energy Research and Development Authority (NYSERDA) and the New York State Department of Transportation (NYSDOT). The conference took place on Friday, October 4, 2013 at the Baruch College Conference Center in the New York City.

The Conference aimed:

- to present cross-disciplinary perspectives on the use of electric vehicles (EV) and other vehicles as a sustainable mobility transportation solution;
- to present ways to link and coordinate invited speakers’ perspectives from engineering, business models, city administration, suppliers and society as a whole;
- to address the key issues on the use of environmentally friendly vehicles in the last mile operations in the New York metropolitan region.

The freight conference was a high-level event that brought together over 100 participants, including renowned national and international speakers, representatives from government agencies in the New York Metropolitan Area; the New York Metropolitan Transportation Council (NYMTC), the Port Authority of New York and New Jersey (PANYNJ), New Jersey Department of Transportation (NJDOT), the New York State Department of Transportation (NYSDOT), the New York City Department of Transportation (NYC DOT).

BACKGROUND

Road transportation is currently the primary means of transport main mode used for freight transportation and goods distribution within the city. This form of travel has a high degree of flexibility, adjusting rapidly to time, place and quantity requirements of client demands. Thus, it is the more adequate option in dealing with the increasing demand for frequent delivery of small loads and to deal with the pressure of reliability and punctuality on suppliers. Despite the considerable role that road transport plays supplying cities, this mode is also the source of many harmful impacts on the urban quality of life. Literature on the topic presents some quantitative measurements of those impacts and externalities, revealing the unsustainable character of road freight transport and of city distribution. Maibach (2000) quantified the total external costs of transport (excluding congestion) by transport means and cost category (Maibach, M., External Costs of Transport – accident, environmental and congestions costs in Western Europe; INFRAS, Consulting Group for Policy Analysis and Implementation and IWW, Universitaet Karlsruhe, Zürich/Karlsruhe, March 2000).

Focusing on the state of freight movement in NYC, the Central Business District of Manhattan is one of the most active commercial centers in the United States. Many deliveries and pickups must be made to and from this area by means of a physically constrained transportation system. As the population of the city increases, so does the demand for products and the freight traffic to deliver them. The number of trucks entering the city is growing at a much faster rate than overall traffic, according to NYMTC annual Truck Toll Volume Trends. The increase in truck traffic creates many negative effects including increased traffic congestion and greenhouse gas emissions. In addition to more traffic, there will be increased competition for street space among transit vehicles, trucks, pedestrians, cyclists, and motor vehicles. According to NYCDOT, commercial vehicles contribute to traffic congestion in Midtown Manhattan and are affected by it as well. The limited number of loading/unloading zones available, in addition to the number of vehicles using the spaces for long-term parking, has forced many trucks and other large vehicles to double-park, thereby reducing the capacity of the affected street by one lane of traffic. The rise in truck traffic is unwelcome news for NYC residents battling truck violations in their neighborhoods. Throughout the boroughs, community groups are fighting off-route violations, oversized and overweight trucks, illegal parking and standing, and incessant idling.

In parallel, NYSERDA and the NYSDOT have recently commissioned some studies related to the movement of goods and the last mile problem in New York. On February 2011, the Rudin Center for Transportation Policy and Management at New York University completed a study titled “Urban Distribution Centers – A Means to Reducing Freight Vehicle Miles Traveled,” which examines the model of freight consolidation platforms, and urban distribution centers (UDCs) in particular, as a means to solve the last mile problem of urban freight while reducing vehicle miles traveled and associated environmental impacts. With funding from NYSERDA, the City College of New York is currently studying the feasibility of operating freight tricycle in New York City for delivering of goods. These vehicles can lead to enormous savings due to a more efficient energy use when compared to conventional vehicles. Moreover, they are environmentally friendly, with high potential for noise and local pollutant emissions reductions compared to motorized vehicles. Their performance benefits rely on the fact that they are small enough to be used widely in the urban context, such as on tight roads and alleys. The type of services in which these vehicles can be used is varied and can include urban logistics; city maintenance (gardening, waste collection), traffic infrastructure management, parking maintenance and enforcement. In the case of urban logistics, trike use helps to deliver goods in a timely manner and to places previously unreachable by larger vehicles. For individual mobility, electric mobility solutions in the form of bi-, tricycles, or small vehicles may provide a last mile option complementary to the use of public transportation. That is why these solutions were selected as primary focus of our attention.

The aforementioned initiatives and strategies are all intended to improve the flow of freight in the city, yet the city is still struggling with major issues for efficiently moving and distributing goods. For this reason, the event was timely as it organized a forum with freight experts and sustainability advocates, and focused on the actions that could be taken immediately to meet the environmental challenges as well as utilize business opportunities presented by a dense central city area such as New York City.

As a result, the proposed one-day symposium focused on the last mile problem in New York City with a discussion of best practices, challenges of accommodating freight movement within an increasingly dense

Central City environment, and strategies developed elsewhere. Speakers with vast experience in these fields were invited, namely, those involved in the recent studies and from Best Urban Freight Solutions (BESTUFS), a program funded by the European Commission that identified the best practices and solutions for urban freight transport in Europe.

This proposed workshop contributed to:

- The public's understanding of the use of small sized electric mobility solutions as a cleaner mobility option;
- Analysis of strengths, limitations and the required infrastructure for their broad deployment.

Moreover, in order to explore the pros and cons of such mobility solutions, speakers discussed potential impacts, market conditions and current challenges in promoting them, including infrastructure investments and reductions on GHG emissions and energy consumption. NYC can benefit from the knowledge of previous successful experiments, probable obstacles, and challenges, as well as potential business models.

PREPARATIONS

Preparations for the Freight Delivery Conference took place from Spring 2013 onwards and were coordinated by UTRC in close collaboration with the Research Centre -IDMEC – IST, Lisbon, Portugal. The conference committee members included the Principal Investigator (PI), Dr. Camille Kanga, the Director of UTRC; the co-PI, Dr. Alison Conway, an Assistant Professor in the Department of Civil Engineering at CCNY; Ms. Penny Eickemeyer, the Associate Director for Research, and Ms. Nadia Aslam, the Project Coordinator and Assistant Director for Technology Transfer at UTRC. The European team members from IDMEC – IST included Dr. Sandra Melo, Dr. Patrícia Baptista, and Professor Tiago Farias of the Research Centre - IDMEC - IST, Lisbon.

The committee held a kick-off meeting to discuss the planning process of the conference by defining in detail the agenda of the conference and identifying additional speakers to be invited. The team selected the appropriate individuals and institutions to be invited. The day and the venue of the event were also determined.

The Mid-Point meeting involved all the preparation related to holding a major conference, including but not limited to, inviting and following up with speakers and moderators, designing and disseminating save the date announcement(s), preparing the formal registration brochure and conference program, dealing with registration, and coordinating with catering and room services on logistics.

ORGANIZATION

The one-day Freight Delivery Conference took place on October 4, 2013 at the Baruch College Conference Center located in midtown Manhattan, New York City, conveniently accessible from all boroughs. The event was planned from 9:00am to 4:30pm. The full day conference agenda included morning welcome remarks from the host institutions and organizing partners who provided an overview of the conference. Four sessions were planned with presentations from industry partners highlighting case studies throughout the world on smart mobility solutions relating to their diverse perspectives.

Session 1- Cities & logistics

Session 2- Cities & Logistics (Continued)

Session 3- Innovative Urban Logistics Solutions – Bikes: Discussion about Bike Use For Freight Delivery In Different Us Cities (Boston, New York City, Portland) -

Session 4- Policy/Incentives/Regulatory Issues

Additionally, academic perspectives provided an overview of cutting edge research solutions on the smart mobility topic. Public sector representatives presented challenges facing the New York City region. Time for questions and answers from the participants was built into the program after each session. The early afternoon networking/luncheon with a keynote speaker from Duane Reade provided a good opportunity for the partners, speakers, and attendees to interact and help in retaining the participants for the afternoon sessions. At the end of the conference, Duane Reade provided demonstration of their recently acquired Electric Vehicle truck.

CONFERENCE STREAMS

WELCOME REMARKS

The conference organizers, Dr. Camille Kamga, UTRC Director and Dr. Tiago Farias, IDMEC – IST, welcomed the attendees and expressed their gratitude to everyone for participating in this important conference. The senior transportation analyst at NYSDOT Region 11, Arkadiy Sherman delivered the opening remarks. The following is a summary of the opening remarks from Dr. Kamga, Dr. Farias, and Mr. Sherman.

Dr. Camille Kamga welcomed everyone to the conference and expressed his appreciation to the conference sponsors – NYSERDA and NYSDOT, to the speakers, the organizing committee members, and the staff of UTRC. He emphasized the importance of last mile freight delivery and the challenges caused by it to large urbanized areas such as New York City. He acknowledged the participation of speakers from international cities that are dealing with these issues and have developed some innovative solutions utilizing cleaner mobility vehicles for last mile freight delivery. He finished his remarks on a positive note as there are currently programs in New York City that are providing incentives and promoting the use of cleaner mobility vehicles for freight delivery.

Dr. Tiago Farias expressed his gratitude to his US colleagues and attendees. He said it is an honor for him to participate in the Last Mile Freight Delivery Use of Cleaner Mobility event. He mentioned that the European expertise in cleaner mobility vehicles combined with the U.S. expertise in the freight and last mile deliveries subject is a very interesting part of this joint organization. He also thanked the sponsors, NYSERDA and NYSDOT. Dr. Farias said that this conference will be a great platform to share experiences from Europe and the U.S. He said, “the vision of Europe is different. The reasons why we’re not succeeding as fast as we would like to are also different. We have technological barriers; we have the culture of diesel in our continent that is tough to overcome”. In his remarks, he pointed out that from this program, we would be able to understand the successes, failure and investment perspectives from both sides as the speakers from different freight projects talked about their vision, funds, and implementation process. In closing, Dr. Farias thanked Dr. Kamga and concluded that this event presented a great opportunity to learn about the future of last mile freight delivery through the sharing of experiences brought together in this conference.

Arkadiy Sherman, the senior transportation analyst at NYSDOT Region 11, delivered the opening remarks.. He discussed that the NYC transportation network serves major economic hubs providing access to two of the largest airports in the country (John F Kennedy International Airport and LaGuardia Airport) with connections to the New Jersey Ports.

Mr. Sherman’s remarks:

Freight is moved intermodally, but at the end – the last mile – nearly all of it arrives by truck – to our homes, businesses, etc., carrying with it our economic hopes, challenges and opportunities, but also the reality of the operational limitations of our local highway system caused by the high level of traffic congestion that this tremendous economic activity brings. It demands all of our attention in order to address the state of that infrastructure, and to promote best practices with respect to Goods Movement in the Urban Delivery setting.

Current efforts have been focused on seeking solutions that have the potential of reducing the energy consumption and associated greenhouse gas (GHG) emissions of the existing multi-modal transportation system. NYSDOT as a voting member of the New York Transportation Coordinating Committee (NYCTCC) has always supported innovative locomotive retrofit programs to ensure environmentally friendly freight delivery. Over the years we have supported funding and delivery of the following Congestion Mitigation Air Quality (CMAQ) programs as follows:

1. Private Fleets Retrofit Program by NYSERDA - \$19 million
2. Municipal Fleets - \$2.4 million
3. Electric vehicles - \$1.6 million
4. CSX (Purchase 30 rail cars capacity barge for NY/NJ rail Cross Harbor) - \$4.7 million
5. Alternative Fuel Demo - \$12.7 million
6. Fleet – wide Emission Reduction programs - \$18.6 million
7. Hunts Point Diesel Emission Reduction - \$15.0 million
8. NYC School Bus Retrofit - \$7.8 million
9. Voucher Incentive program - \$6.6 million

He mentioned that the event will be useful to learn and seek ideas about energy-efficient, integrated, sustainable, and innovative strategies, policies, emerging technologies and partnerships, so that the Last Mile – which has the most impact on the businesses and the residents of this region, receives its fair share of attention. The Region and the City are seeking solutions that have the potential of offering effective transportation choices and sustainable designs that enhance connectivity and achieve economies-of-scale that support broader deployment and the maximization of efficiencies.

He concluded his remarks by saying that he is looking forward to this conference, and to hearing about national and international ideas and efforts that demonstrate viable concepts that prioritize Last Mile/Urban delivery, leverage and integrate existing infrastructure, resources and planning, and provide a long term solutions toward Urban Freight Delivery.

PRESENTATION SUMMARIES

The event was segmented into four different sessions, each moderated by a transportation expert in the NY Metropolitan region. The summary from presenters from each session is listed below.

SESSION 1

MORNING SESSION: CITIES & LOGISTICS

The objective of this session was to discuss the freight logistics in the New York State Region and compare it with the European cities with their best practices.

The moderator of this session was **Howie Mann**, the Associate Transportation Analyst at NYMTC. Mr. Howie Mann introduced the panel members;

- Stacey Hodge, NYCDOT
- Laetitia Dablanc , IFSTTAR ,Paris
- Sandra Melo, Instituto Superior Técnico, Lisbon
- Patricia Baptista, Instituto Superior Técnico, Lisbon

Each member of the panel delivered provided a short presentation summarized as below:

Stacey Hodge, Director of the Office of Freight Mobility for the New York City Department of Transportation

Last Mile Freight Delivery: Cities & Logistics

NYCDOT focuses on operating streets and making sure that goods and people can be moved safely. NYCDOT has collaborated recently with research institutes to leverage the public & private sector and researcher benefits.

The presentation outlines:

- Overview of the NYCDOT
- NYC Truck Routes
- Bridge Hit Mitigation
- Sustainable Deliveries
- Land Use and Freight
- Outreach

Overview of the NYCDOT

As one of the research practitioner collaborations of NYCDOT, Rensselaer Polytechnic Institute (RPI) is currently working with NYCDOT on urban freight issues. NYCDOT also has something that is called “delivery windows”, where curbs are taken away for truck delivery only. NYCDOT has to address conflicts at the city when the land use doesn’t match with some of the activity that is happening. NYCDOT has to share this space in the city with pedestrians, bikers, trucks, and we have to find a way to get all of those users to understand how to safely share the street. NYCDOT has about 58 hundred miles of streets, sidewalks, and highways, over 1.3 million signs, 12,460 intersections with traffic signals, 789 hundred bridges and 6 tunnels. NYCDOT operates the Staten Island

Ferry that carries about 20 million people a year and our agency has about 4 thousand people. NYCDOT Office of Freight Mobility was created in 2007 to address the need to have a point of contact to work with the freight industry and the community on freight issues. The department is tasked with trying to balance the need to move goods as well as to keep the pedestrians and residences safe from impacts from trucks. NYCDOT has its infrastructures intermingled with a lot of other agencies who have jurisdiction, so we work with other agencies. The following is list of partners who have done projects with our office or funded work or collaborating on research.

- United State Department of Transportation (USDOT)
- New York State Department of Transportation (NYSDOT)
- NYU Wagner – Graduate School of Public Service
- Rensselaer Polytechnic Institute (RPI)
- Rutgers University
- New York State Energy Research and Development Authority (NYSERDA)
- University Transportation Research Center (UTRC)

Other agencies working work with NYCDOT are; NYPD, NYS Highway Patrol, NYSDOT, CT State Police, Metropolitan Transportation Authority (MTA) Bridges & Tunnels, Westchester County, NJ Turnpike Authority, Port Authority NY&NJ, American Transportation, Research Institute, UTRC Region II, NYS Motor Trucking, Association of American Truckers, Association of NYS Thruway Authority. We rely on the New York Police Department heavily to enforce the rules of truck routes and curb signage. Through the NYCDOT outreach with businesses, there are a number of different private sector industries that are collaborating with NYCDOT on last mile issues. These companies need to make deliveries or receive a delivery and NYCDOT is trying to help them with either off-hour deliveries or some type of curb regulation change. These include; Duane Reade, Intercontinental Hotels & Resorts, The Chefs Warehouse, Olive Foot Market, The Waldorf Astoria, Eric Kayser, Hilton Hotels & Resorts, Georgetown Cupcakes, Whole Foods Market, New York State Restaurant Association, CVS Pharmacy, The Beverage Works, Wakefern Food Corps, Sysco, Gap, and Gristedes. NYCDOT works with some of the organizations in business improvement districts, which represent retailers or other businesses within their area. These include; Food Industry Alliance, Grand Central Partnership, 34th Street Partnership, the New York State Motor Truck Association, Manhattan Chamber of Commerce, Downtown Alliance, and the New York State Restaurant Association. They all work with NYCDOT and help the Department to get information out, post focus groups and help to get the Department's initiatives off the ground.

NYC Truck Routes

Our office manages the truck route network. This is a snapshot of the network.



Figure 1: Truck Route Network in New York City (Source: NYCDOT)

As shown in the map, Manhattan in the middle and on the right would be Queens and Brooklyn...and the red lines are thru truck routes...and the blue lines are local truck routes. That becomes important for the police department when they're enforcing the trucks that are supposed to be on these identified routes. There are also several different agencies who have infrastructure just in this one snapshot; MTA Bridges and Tunnels and the Port Authority as well as New York City. There are about nine hundred miles of truck routes in the City. There are local and through truck routes. Local truck routes are for use by trucks with an origin or destination within the respective Borough and trucks may operate on non-designated streets for the purpose of arriving at their destination. Thru truck routes are for use by trucks with neither an origin nor a destination within the respective borough.

Bridge Hit Mitigation

The Parkway bridge hit is another problem that NYCDOT has to deal with. A lot of times trucks come from out of state and they don't know that in the state of New York, trucks are not supposed to be on the parkways. The reason for that is NYS parkways have a lot of low height clearance bridges. When a bridge hit incident happens, it can take NYCDOT quite a while and up to about 4 hours to clear the incident. The Port Authority of NY and NJ, NYSDOT, NYCDOT all have this problem; so it's not unique to just NYCDOT and it's also an international

problem. NYCDOT populates the map with red dots which show low bridges on parkways and makes it available on their website.

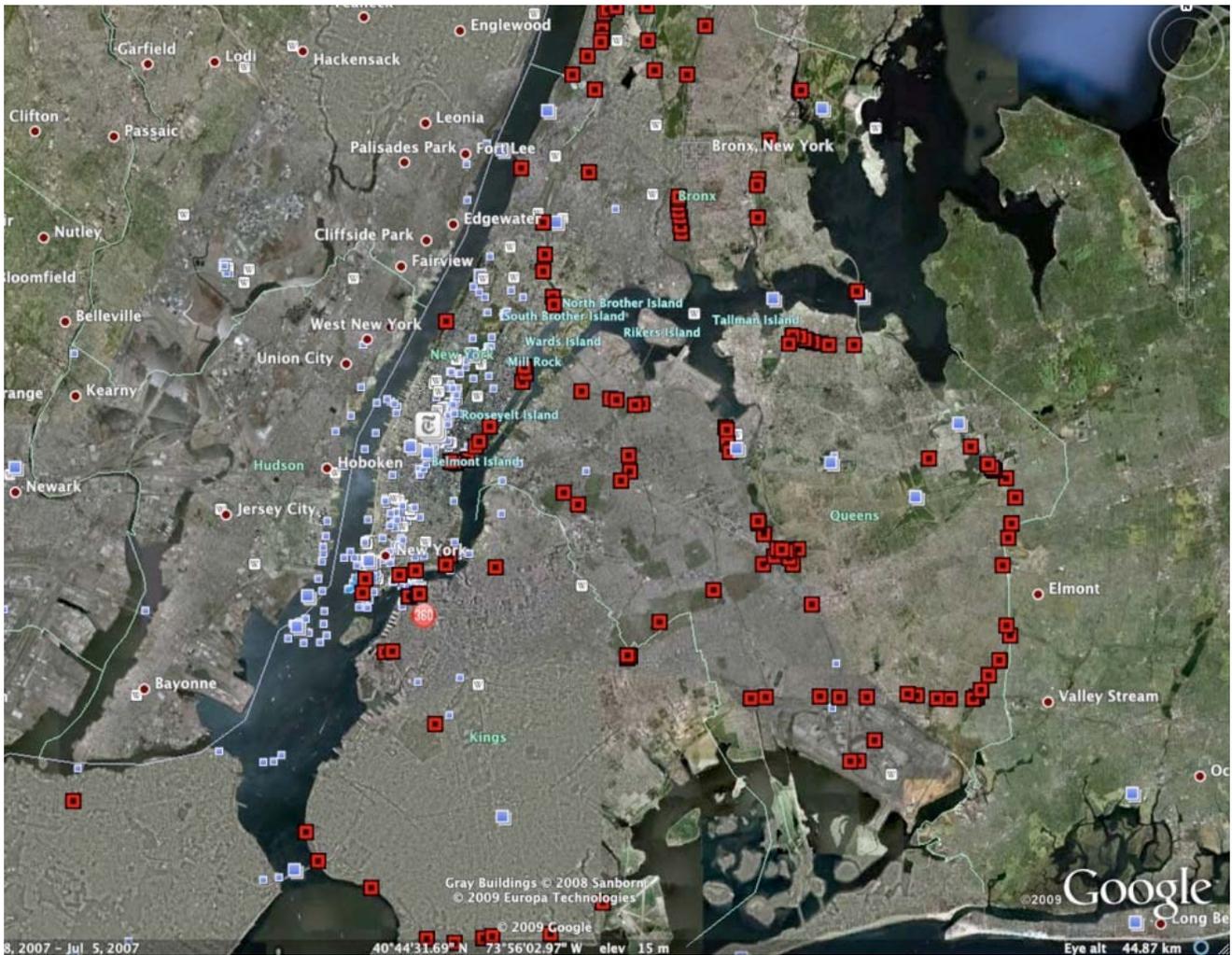


Figure 2: NYCDOT populates the map with red dots which show low bridges on parkways (Source: NYCDOT)

NYCDOT is hoping that people will plan their trip before they come to the area so they would know where they shouldn't be. They can snap on to one of those dots and it will tell them the clearance of that bridge. There are also activation systems that NYSDOT has done to trigger a sign before the truck gets to the bridge and that has worked well. NYCDOT did a pilot on the Hutchinson River Parkway so that every truck that was caught, were taken a picture with records of the time and date so that the bridge hit problem could be documented and hopefully funding could be requested to acquire these types of warning systems to be implemented state wide.

Sustainable Deliveries

NYCDOT also works for making sure of Sustainable Deliveries. The residents of the upper west side of Manhattan and the industry came to NYCDOT because so many double parked trucks were in that area to make deliveries, and then pedestrians cannot see clearly to make safe crossings. So basically FedEx and UPS came to NYCDOT and asked, "Can NYCDOT change these curb regulations so that they can get to the curb and get less

parking tickets?” They do get quite a few tickets. And so NYCDOT investigated that location and looked for opportunities to take away some parking spots and give it to trucks.

Land Use and Freight

One of other problems addressing the last mile is land- use conflicts. NYCDOT is trying to address this problem by changing truck routes or putting up signage to direct trucks to industrial areas using the best route that would have the least impact on residences. NYCDOT does not control all zoning so is trying to work more closely with the Department of City Planning that has jurisdiction over land- use in order to have a smarter policy going forward. The mayor has incorporated off-hour deliveries into PlaNYC.

Outreach

NYCDOT outreach efforts include:

- Industry Listening Sessions
- Truck Ride Alongs
- Focus Groups with Business Operators
- NYS Motor Truck Association Coordination

NYCDOT did some focus groups because to seek support from other agencies. NYCDOT was looking for some sort of incentives to help people make the shift if they need to do some retrofits to their buildings. To allow off-hour deliveries- that require business incentives or some type of tax credit for those businesses that are being smart about their truck impacts. The Environmental Protection Agency and the FHWA have put out grants for other cities to try to replicate what was done in NYC and a lot of cities have been calling NYCDOT for more information on the off-hour delivery program. So the program is viewed as a success. NYCDOT has been out with industry to understand their needs. Since 2011, NYCDOT has done something called “truck side view” during the summer. For 3 weekends in August, NYCDOT gets people to sit in a truck and see what the truck driver can see so they understand the perspective of the truck driver. It is an effort by NYCDOT to try to address last-mile conflicts with pedestrians and bikers in the community because a lot of them have no idea that the truck driver cannot see them.

Dr. Laetitia Dablanc, IFSTTAR, University of Paris-Est

City Logistics in European cities

City logistics is a global organization of urban goods movements in a manner that promotes economic and environmental standards and is adequate to the demand for new logistics services in cities. City logistics includes physical operations such as order preparation, shipments consolidation, transport (including home deliveries), short or medium term storage of goods, management of drop-off/pick-up boxes for parcels, return of pallets and empty packages. It often involves the use of clean motor vehicles or – more rarely - alternative modes (waterways, light rail). Since the mid 2000s, entrepreneurial initiatives in city logistics can be found in many European cities. Companies such as Shurgard provide urban storage space for shopkeepers. Star’s Service, a French transport company with 1,500 truck drivers, has been highly successful by specializing on home deliveries of food products to urban households. In Germany, the Deutsche Post has installed thousands of “PackStations,” or automated locker banks, in cities’ public spaces so that e-commerce consignments can be delivered at any time of the day to customers. Many start-up companies are developing delivery services using electrically assisted cargobikes, with names such as La Petite Reine (Paris), The Green Link (London and Paris), Colizen (Paris). In

major cities' business and commercial districts, large companies such as FedEx, United Parcel Service (UPS) and Track n Trace (TNT) are using these small delivery companies as contractors.

The municipality of Paris is one of the most active European cities to promote city logistics initiatives. A “Charter for Sustainable Urban Logistics” was signed on September 18, 2013 with business organizations and many other stakeholders. The objective is to dramatically reduce the use of diesel vehicles for deliveries. A set of 16 strategies has been identified in order to reach the objective. One of these policies, already implemented by the municipality of Paris for several years, is the provision of urban logistics terminals at a low price, so that city logistics operators can use clean delivery vehicles with limited range (electric vehicles, cargobikes). These policies have been rather successful. However, on the whole, city logistics initiatives are complex and costly to implement. Today, they represent only one percent of the total number of deliveries carried out every day in the Paris metropolitan area (10,000 deliveries out of one million).

Sandra Melo, Patrícia Baptista and Tiago Farias, IDMEC/IST – Instituto Superior Técnico, Department of Mechanical Engineering

The use of cleaner mobility solutions in Europe for last mile delivery services

Energy, emissions, traffic and system efficiency in urban centers are affected by urban logistics, also denominated last mile delivery. Urban logistics refers to the delivery of goods within the cities and those operations are mostly by motorized vehicles along road infrastructure.

The European vision for urban logistics, presented in the white paper (*Roadmap to a Single European Transport Area*), envisages halving the use of ‘conventionally-fuelled’ cars in urban transport by 2030 and phasing them out in cities by 2050. That will allow reducing the negative impacts of urban logistics and achieving CO2 free city logistics in major urban centers by 2030.

To achieve those targets, one of the trendy European approaches deal with cleaner solutions, namely electric vehicles, which have started to become available for last mile delivery operations. However, the market penetration of these initiatives is still low. Another approach, increasingly popular in Europe, regards the small-sizing of delivery vehicles. Light goods are often transported over very short distances by heavy duty vehicles. Every second trip in urban areas is shorter than 5 km and could easily be done by small-size vehicles such as bikes, trikes or cargo-cycles. As a result, there is a 25% potential of shifting all trips from motorized vehicles towards cycling-related solutions.

On this domain, the European Union has been promoting in the past years several initiatives to promote a more sustainable urban freight delivery. Examples of those efforts are the European projects and studies that have been funded in recent years, in particular:

- ELCIDIS (Electric vehicle city distribution systems), 1998-2002, <http://www.elcidis.org/>;
- CIVITAS, 15 projects on sustainable urban mobility, 2002-2016, <http://www.civitas-initiative.org/thematic-categories/urban-freight-logistics>;
- BestFact (Best Practice Factory for Freight Transport), 2012-2015, <http://www.bestfact.net/>;
- Cyclelogistics - Moving Goods by Cycle, 2011- 2014, <http://www.cyclelogistics.eu/>;
- STRAIGHTSOL (Strategies and measures for smarter urban freight solutions), 2012-2014, <http://www.strightsol.eu/>;
- E-Mobility NSR (North Sea Electric Mobility Network), 2011-2014, www.e-mobility-nsr.eu;
- ENCLOSE (ENergy efficiency in City LOGistics Services for small and mid-sized European Historic Towns), 2012-2014, www.enclose.eu;
- FREVUE (Demonstration of Urban Freight Electric Vehicles for Clean City Logistics), 2013 – 2017, <http://frevue.eu/>;

- DOROTHY (Development of RegiOnal clusTers for research and implementation of environmental friendly urban logistics), 2013-2015.

Besides these examples of European projects on last mile delivery, there are also some specific practical applications that are taking place in European cities and which are worth mentioning in the scope of this event. The North Sea Region Electric Mobility Network (E-Mobility NSR) is a relevant study that provides state-of-the-art information and analysis, case applications from seven European countries. Examples referred to in this study, as well as some practical applications in Europe, reveal that the use of small electric vehicles, such as cargo bikes and electric bikes, are now being used in a broad type of services.

Just as an example, in Austria these vehicles can be found in food delivery, mail services, window cleaner, urgent bike messengers, and advertisement distributors. In Denmark, they are used in all sorts of goods transport, namely street vendors, post and packages deliveries, shopping as well as for parents to move children to day care centers. Many other examples can be found in Europe and could have been mentioned here, but what we would like to highlight is that one of the lessons that can be learned from those European experiences is that safety and security is one of the main issues pointed out by users and potential users for the implementation of these solutions. Such fact contrasts with what has been pointed out as the main concern and focus in New York. As presented by Allison Conway, in New York, the small electric vehicles are mostly used in food delivery and the key issue to the adoption of these solutions is the temperature of the load.

These differences are expectable and comprehensive due to the specific contexts of each region. But the important question to raise is: what are we doing, either in Europe or in USA, presently that will expectably lead us to a successful implementation of small electric vehicles? Are we actually in the right path to achieve a widespread use of cargo cycles and electric bikes on last mile issues?

The first point to remember is that this is not a new solution. In 1881, the British Post Office was already using a carrier cycle to deliver post and packages. What has happened and changed in the last 132 years on the use of small electric vehicles to deliver goods? Actually, not much. Apart from the fact that there is now a larger variety of models on the market, some able to transport up to 500 kg (approximately 1102 lb), with a range of prices from 800 to 6000 euros (+/- 1090 to 8200 USD), the base solution did not change much in concept. On the other side, the barriers that this type of solution must overcome are difficult to transpose. According to a study carried out by Transport for London, one of the biggest problems seem to be the misperception about safety, security and theft of both cycles and payload. This is an issue that can only be minimized with the practical results from operation. Other main issues include the availability of technology, how the users are or not ready to use the technology, how the technology replies to the users' needs, if the cost of the technology is acceptable for the users, how do users consider the technology reliable for their purposes /for example, autonomy of batteries, load capacity, etc.). These technologically related issues are quite relevant as it is needed in many cases to fight a pre-existent diesel culture from the suppliers' side. Lastly, in what refers to the specific use of bicycles and cargo bikes, there are also important obstacles related with the driver fatigue, the range of this solution (4 to 7 km or 2,5 to 4 miles), the topography of the city and the weather (seasonality) of the area. Each city has its own intrinsic context that makes each of these barriers to be relevant or not to the adoption of small electric vehicles for last mile purposes.

The challenge is to be able to address this topic in the most effective way. In terms of research, that challenge can be translated into the following questions:

- 1) How does the use of cleaner mobility solutions affect traffic, energy efficiency and emissions?
- 2) What should be the geographical coverage of cleaner mobility solutions replacing conventional vehicles on city logistics?
- 3) What is the appropriate business model, the adequate incentives and policies?
- 4) How do these solutions behave in real world conditions?

The research center IDMEC-IST (Lisbon, Portugal) has tried to focus on these questions, through two different methodological approaches. The first one has been through the macro-simulation of traffic impacts of the introduction of small electric vehicles. Such ex ante methodology estimates the impact in terms of traffic, environment and energy of implementing small electric vehicles in a specific city and defines how the other road users (buses, private cars, vans, trucks, taxis) are affected by this solution, what is the suitable geographical range for this solution to be beneficial for all the users and what should be the size of the fleet running on the city. The second one has been through the ex post methodology of road monitoring electric vehicles and electric bicycles, quantifying the dynamics and energy consumption of the vehicle. From the research perspective towards the topic of cleaner mobility solutions, authors believe that this is the correct path to follow in order to assist decision making. One potential good solution, without the essential ex-ante assessment, can easily turn from a sustainable dream into a regulatory nightmare.

SESSION 2

AFTERNOON SESSION: CITIES & LOGISTICS (Continued)

Continuing the Cities and Logistics theme of the morning session, the afternoon session aimed to examine freight issues and policies by comparing the goods movement in major US cities and European cities.

The session was moderated by Tiago Farias, an Assistant Professor at the Mechanical Engineering Department of Instituto Superior Técnico, Lisbon. The panelists were;

- Cathy Macharis, Vrije University -Brussels
- Hans Quak, TNO Mobility and Logistics
- José Holguín-Veras –RPI
- Erik Andrus, Vermont Sail Project

The summary of each of this session presenters is as follows:

Prof. Cathy Macharis, Vrije University -Brussels

The 4 A's of sustainable city distribution: an overview of innovative urban logistics solutions

Within this presentation four categories of innovation in city logistics are presented. A “4 A's” framework for sustainable city logistics is used: Awareness, Act and shift, Avoidance, and Anticipation. The first A, Awareness, refers to making all actors aware of the social return of sustainable practices that lead to improved health, safety, air quality, and so forth. Actors calculate economic returns, but they don't know the social returns in monetary terms. Knowing the social returns can help actors cooperate and equitably share costs and benefits among companies and government.

To calculate the social return first means calculating the costs of externalities like poor air quality, noise, and poor health. This requires good data on emissions, routes driven, population, and so forth.

Another way to build awareness is through voluntary programs and certifications like the Lean and Green program in the Netherlands, and Flanders and SmartWay in the US. Companies participate in these programs by promising, in the case of Lean and Green, to reduce their CO₂ emissions by 20% in the next five years. This sets an example for other companies and creates awareness.

The second A, Avoidance, refers to avoiding unneeded traffic. Innovations in avoidance focus on avoiding empty miles driven and improving the capacity utilization of existing trucks. Straightsol, a three-year EU funded urban

freight research effort, studied for example Oxfam, a British charity that recycles textiles and books. In this example, Oxfam collection bins were equipped with sensors that indicated the level of donations in the bin. The sensors allowed remote monitoring of the bins and eliminated the routing of trucks to bins that were still empty.

Another way to reduce traffic is by bundling via consolidation at city distribution centers. A different demonstration within Straightsol, that of the mobile depot of TNT in Brussels, shows interesting results. In this example, TNT created a mobile depot within the city from which deliveries were made via electric bikes within the city. Previously, an average of 5.5 vans came into the city center daily. Now, one full truck enters the city and acts as a mobile depot from which deliveries are made by electric bikes.

The third A, Act and shift, recommends shifting to more environmentally-friendly modes such as barge and train. Although this concept isn't transferable to all cities, as noted in Giulliano and Da Blanc's white paper, all large cities in Europe were constructed around rivers. Barge transport can be used for city distribution. Amsterdam, Utrecht and Paris are all doing this. Utrecht has the "beer boat," and in Paris a container arrives via river to the center of Paris from where freight is distributed to small establishments. In Flanders, Belgium, some successes have been realized in the shipping of palletized freight on the inland waterways. Barges could carry anything from building materials to fast-moving consumer goods. Cargo trams are another example of a shift in mode. In Dresden, cars from the Volkswagen factory enter the city via tram rather than big truck. Cargo trams work in specific situations like this, but they may be harder to implement for distributed flows. Finally, off-hour deliveries are another solution demonstrated by Straightsol. Five supermarkets will receive in Brussels night-time deliveries from PIEK-certified trucks that are less noisy.

The fourth A, Anticipation, refers to using new technologies such as natural gas for vehicles, or electric vehicles, for more sustainable city logistics.

So there are many possibilities to go to more sustainable logistics, however many implementations fail. The reason for this is that there are many actors involved in an implementation: shippers, receivers, logistics providers, authorities and citizens. Each actor has their own objectives. For example, citizens don't want the noise of night-time deliveries. Straightsol developed an evaluation framework for city distribution concepts, in which the actors are explicitly involved and included. Next to the traditional social cost benefit analysis and business models, a methodology called MAMCA (Multi Actor Multi Criteria Analysis) is used in order to take each actor's objectives into account and weight the importance of those objectives. With MAMCA, it's possible to see who is likely to support or oppose a given scheme.

So to conclude, sustainable city distribution is possible through awareness, avoidance, act and shifting, and anticipation as long as a fifth A -- Actor involvement -- is taken into account in the multi-actor setting of a city.

Dr. H.J. Quak, Senior Scientist @ TNO Sustainable Transport and Logistics

Towards zero emission city logistics

FREVUE – demonstrating freight electric vehicles in urban distribution

The FREVUE project

The growth of cities in Europe is providing greater economic, social and cultural opportunities for its citizens. To support this growing demand for goods, services and movement however, cities are increasingly affected by significant air and noise emissions as well as increasing congestion.

With the logistics industry being a significant driver of economic growth, as well as a major contributor to these issues, improvements in this sector are required to ensure our cities fulfill their potential. Many initiatives have been taken in urban logistics, but it is striking to see that the uptake of electric freight vehicles (EFV) in urban logistics is at this moment still really low. There are many questions and uncertainties with regard to these

vehicles that hold back private companies in investing in these vehicles. Therefore, within the seventh framework program the European Commission funded a research project in the call ‘Demonstration of Urban freight Electric Vehicles for clean city logistics (theme: GC.SST.2012.1-7)’: FREVUE (Freight Electric Vehicles in Urban Europe) that will demonstrate to industry, consumers and policy makers, how electric freight vehicles can provide a solution to many of the problems in urban areas.

In FREVUE at least 127 electric freight vehicles will be exposed to the day to day rigors of the urban logistics environment and prove that the current generation of large electric vans and trucks can offer a viable alternative to diesel vehicles; particularly when combined with state of the art urban logistics applications, innovative logistics management software, and well-designed local policy. The project is co-funded by the EU Seventh Framework Programme (FP7), the demonstration projects will occur in Amsterdam, Lisbon, London, Madrid, Milan, Oslo, Rotterdam and Stockholm. Next to these cities, industry partners and research partners are involved in FREVUE.

The demonstration projects have been designed to ensure the range of conditions that are common across Europe are covered, including:

- goods deliveries (including food, waste, pharmaceuticals, packages and construction goods)
- novel logistics systems and associated ICT (with a focus on consolidation centers which minimize trips in urban centers)
- vehicle types (from small car-derived vans to large 18 tons goods vehicles)
- climates (from Northern to Southern Europe)
- diverse political and regulatory settings that exist within Europe.

At the conclusion of the project, the final objective will be to encourage the exploitation of the results through a targeted dissemination campaign aimed at decision makers across the logistics industry and associated policy makers and regulators. FREVUE started in March 2013. A state of the art review is finished and its summary follows

State of the art: electric freight vehicles implementation in city logistics

Implementation of electric freight vehicles (EFVs) is not a new phenomenon. Over the last two decades several trials and demonstrations have been undertaken. Although today’s EFVs have greater range and improved loading capacity, the actual implementation of EFVs in city logistics operations is still limited. This FREVUE deliverable aims to identify current challenges and obstacles to the implementation and uptake of EFVs in city logistics, as well as to provide feedback and lessons from past and on-going projects. A review of demonstrators, trials and initiatives with EFVs resulted in the following challenges and success factors for EFV implementation and uptake in daily city logistics operations:

Technical performance: the range of EFVs is usually not larger than 100 – 150 kilometers. The range promised by the manufacturer is often not reached, although new(er) vehicles have a higher real range. Whether the range is a limiting factor depends on the logistics operations. Technical issues observed include: failing batteries (and limited or late) support, equipment availability issues, relatively long charging time and the necessity to adapt charging infrastructure for fleet needs. The rapid improvement in the technology is mentioned as a reason for waiting to acquire EFVs. The limited availability of standard vehicles and vehicle types is also a factor that is seen as a barrier for EFV implementation.

Operational performance: EFVs demonstrate both positive and negative operational performance characteristics compared to conventional vehicles. Because of their environmental performance and reduced noise level they are often permitted in larger geographical areas and time windows in cases where any of those restrictions exist. Some technological features, like an acute turning range, steering circle and improved visibility facilitate the maneuvering of the vehicles in dense city areas. At the same time, charging, load capacity, maintenance and the need to adapt logistic concepts for the usage of EFVs are seen by operators as the main existing operational

challenges. Not all freight operations are currently suitable for using EFVs, which is particularly the case for the long-haul operations and vehicles with a large loading capacity. In terms of the range, the payload and overnight charging, current EFVs performance levels are good enough for the distribution operations.

Economics: currently the purchase price and total cost of ownership (TCO) for EFVs are significantly higher than for conventional vehicles. That is explained by the high battery cost and limited production volumes of these vehicles. In the longer term it is expected that EFVs will become more competitive, incorporating savings from the improved operational performance, reduction in purchase prices due to the massive production and associated environmental benefits. Currently, as operators are usually more focused on short term benefits, the wider uptake of electric vehicles (EVs) is difficult. The fact that the second-hand market and residual value of EFVs are not yet clearly known holds back some of the operators in their purchase decision. Leasing and financing companies are also reluctant to invest due to these uncertainties. Battery leasing or swapping options are regarded as potential options to reduce vehicle purchase and operational costs.

Environmental performance: undoubtedly EFVs have improved environmental performance, manifested in reduced CO2 emissions and reduced local emissions, compared to the conventional vehicles. For the full picture well-to-wheel emissions need to be considered and therefore certification of the electricity supply becomes important. No consensus has yet been reached on the wider systemic impacts of the EFVs which are mainly related to congestion.

Social and attitudinal impact: being less noisy and more environmentally friendly than conventional vehicles, EVs are very well perceived by the general public and are receiving positive feedback from drivers in most of the initiatives. Training is necessary in order to familiarize drivers and general transport operators with the technical and operational particularities of the vehicles in order to achieve better results from the vehicle performance. The low noise generated was sometimes reported as a concern for the EFVs operations in the agglomeration areas.

Impact of local policy and governance structure: at the current stage of the EFVs market development appropriate government policy is necessary in order to achieve the wider uptake of the EVs. Measures both supporting the usage of EFVs and discouraging the usage of conventional vehicles are required and are already being successfully implemented by several European municipalities. Another way to stimulate the wider uptake of EFVs is by using them in the authorities' fleets.

Overall, the overview of EFV initiatives in city logistics identified three key issues:

1. The need for an adapted logistics concept that enables the use of EFVs in city logistics operations to overcome range and load concerns.
2. The need (or desirability) of authorities support to increase EFV uptake in city logistics activities.
3. The opportunities that EFVs offer for private logistics companies to demonstrate their commitment to improving their environmental performance i.e. green image, visibility in cities.

José Holguín-Veras –RPI

The Efficiency Paradox: Why Technology is only part of the solution

Transportation is a key engine of economic development and globalization accounting for 9.8% of the US GDP. It is a major source of employment (1 out of 4 workers are in trucking and logistics) and Freight plays a important role to a nation's economy and created dynamics. In general, transportation consumes 27.8% of the total energy, and 70% of the petroleum. Transportation produces 53% of the carbon monoxide, 31.3% of the nitrogen oxide, 24.2% of the volatile organic compounds, and 39.3% of the carbon dioxide.

The Center of Excellence for Sustainable Urban Freight Systems Led by Rensselaer Professor Jose Holguín-Veras, New \$4 Million Center Is Designated by the Volvo Research and Educational Foundations as a Center of Excellence. The center is dedicated to investigate new ways of infusing sustainability and efficiency into the way

businesses send and receive goods. The center's goal is to jumpstart an integrative process – involving cities, private sector, and researchers- that will lead to the implementation of new freight systems paradigms that are sustainable, increases quality of life, foster economic competitiveness and efficiency, and enhance environmental justice. The center is working on producing a comprehensive handbook of how to improve freight systems in metropolitan areas.

Though Technology is playing an important role in making the Freight systems more efficient, but in addition to that, we need the following key components of a holistic approach; policies that foster behavior change; we (users, consumers, businesses, etc.) have to change the way in which we do things. We need incentives and research that helps understand how best to accomplish a better policy implementation. The system needs technologies that are needed to reduce the consumption rates, mitigates/remediate the damage produced by economic activity, manage the use of resources, etc. Sustainability is a design problem and can be solved by redesigning the economy and urban environments.

Electric Vehicles are more expensive than the ones with traditional engines but they are undoubtedly better for the environment. As a result of the cost, companies that purchase EVs may put themselves at a disadvantage vis-à-vis competitors that use traditional trucks. A major role that public policy can play is through providing Incentives through Vouchers, like the ones in NYS. The vouchers only appeal to environmental conscious companies that value good PR but they are not enough to convince the masses of companies making the 300,000 deliveries per day to Manhattan. The other concern is that public sector incentives are hard to come by in financially constrained times. There could be other possibilities. The citizens could provide the incentives needed to foster sustainability of supply chains: a certification program that rates the degree of sustainability of the supply chains serving a establishment that will provide information to citizens about what the companies are doing for sustainability, lead citizens to patronize the businesses doing good, and ultimately, provide the incentives needed to foster transformation.

The potential impacts of Off-hour deliveries in NYC leads to; time savings to all travelers; 3-5 minutes per trip; time savings to carriers in off-hours: 1.5-3.5 hours/tour. This will result in economic benefits between \$100-\$200 million/year.

In conclusion, sustainability can be achieved by a consumer/producer behavior change. The technology-only approaches don't always lead to more sustainable outcomes, if technology leads to lower costs, it may induce demand. The demand management is needed to ensure a more sustainable outcome. If the technology does not lead to lower costs, private sector is less motivates to embrace it technology. Other incentives are needed from public sector or citizens Implementation path is more difficult. Holistic approaches are the key to solve the issue.

Erik Andrus, Vermont Sail Project

Vermont Sail Project

The Vermont Sail Freight Project is a water transportation initiative with a food and farming systems focus launched under the sponsorship of the Willowell Foundation and with the support of Greenhorns, USA. The objective is to explore an alternate business model for rural-to-urban freight logistics that is rooted in a strong regional history and tradition of waterborne freight logistics. The chief activity of the project to date has been to design and build a low-cost freight barge, sail powered with motor auxiliary and a cargo capacity just under 15 tons. This has been accomplished with a barebones budget of donations and small grants and approximately 3000 hours of skilled volunteer labor. "Ceres," the sailing barge, is plying a trade route spanning some 300 miles between Lake Champlain and New York City in the fall of 2013, carrying over 160 agricultural products from 37 New York and Vermont farmers. A successful outcome of this initiative would entail sufficient revenue to sustain operations and would suggest future potential for cargo-carrying watercraft to ease pressure on land transit infrastructure while also fostering public engagement with the waterfront in a way that fosters ecological stewardship and enhances metropolitan civic life.

Michael Fowles, Fleet Manager, Duane Reade

Duane Reade - Last Mile Freight Delivery

Duane Reade takes its name from the Company's first successful full-service drugstore, which opened in 1960 on Broadway between Duane and Reade Streets in Manhattan. (Yes, we know they don't intersect...it makes for a better picture!) Since then, Duane Reade has grown to become the most recognized drugstore chain in metropolitan New York. Today, the Company operates over 250 stores in commercial and residential neighborhoods throughout New York. Duane Reade's conveniently located stores carry an extensive assortment of items, including those from the pharmacy as well as vitamins, nutritional products, cosmetics, greeting cards and photo processing. The company has ranked as the fastest-growing drugstore chain in the industry, and is number one in sales per square foot. Duane Reade completed its initial public offering of common stock on February 10, 1998. In 2010 Duane Reade became part of the Walgreens family of companies, the nation's largest drugstore chain with more than 8,000 stores in all 50 states, the District of Columbia and Puerto Rico.¹

Duane Reade's fleet manager, Michael Fowles mentioned about the toll roads and parking regulations that will impact the company's transportation costs. He mentioned that the wheel equipment store delivery, an innovative concept, has reduced the delivery time to the store from hours to minutes.

He also mentioned the largest New York City-based chain of drug stores, Duane Reade, partnered with Smith Electric Vehicles to bring zero-emissions delivery trucks to their fleet. Smith's Newton electric delivery trucks are capable of going over 100 miles on a single overnight charge, have regenerative braking systems, can carry 16,000 pounds of goods, and have an annual upkeep cost that is 1/3 to 1/2 less than a regular diesel truck. Move over gas guzzlers, New Yorker's shampoo will now be delivered with a smaller carbon footprint.

Duane Reade is the first pharmacy group in the United States to choose electric vehicles for delivery purposes. The chain of 250 New York stores is part of the Walgreen's brand, which owns 7,700 stores — and has a presence in all 50 states. Perhaps the electrification of part of the Walgreen's brand fleet will help push the rest of the brand in the zero-emission, long-term cash saving direction.²

Fowles mentioned in his presentation that Duane Reade is working with NYC to help address the impact of vehicle deliveries to neighborhoods with the highest asthma rates by using electric trucks exclusively to select stores in:

- Manhattan: Central Harlem and Morningside Heights
- Bronx: Hunts Point and Mott Haven
- Brooklyn: Williamsburg and Bushwick
- Queens: Jamaica

Mission Electric program introduced our electric fleet to NYC and we will service stores in most engaged neighborhoods and participate in community, safety, and public events with Electric Trucks. Mr. Fowles wrapped up his presentation by talking about additional initiatives that Duane Reade will be working on, those include:

- After hour delivery program
- NYC Green Loading Zones
- Inductive Charging
- Methanol Fuel Cell

¹ <http://www.duanereade.com/Company.aspx>

² <http://inhabitat.com/nyc/duane-reade-bringing-electric-delivery-vehicles-to-new-york-city/duane-reade-electric-1/>

SESSION 3

INNOVATIVE URBAN LOGISTICS SOLUTIONS – BIKES: DISCUSSION ABOUT BIKE USE FOR FREIGHT DELIVERY IN DIFFERENT US CITIES (BOSTON, NYC, PORTLAND)

The third session brought together the innovative concepts in urban logistics in different US Cities; Boston, New York City, and Portland. The session was built up around a discussion facilitated by the moderator, Alison Conway, an Assistant Professor of Civil Engineering at the City College of New York. The discussion forum members included three experts working in the Freight Industry with their innovative ideas and solution.

- Wenzday Jane, Metro Pedal Power
- Franklin Jones, B-Line: Sustainable Urban Delivery
- Gregg Zuman, Revolution Riskshaws

Each presenter summarized the work of his/her relevant company/organization.

Wenzday Jane, Metro Pedal Power

Metro Pedal Power

Metro Pedal Power was founded in 2007. We're a small company doing a variety of last mile freight and hauling around the dense congested areas of Boston. Our revenue is around \$350K, with 3 full time and 5 part time employees. We are building a work environment that is voluntarily associated, transparent, and democratic, and we are envisioning an organizational structure that will preserve our values even as we continue to grow.

Our fleet is about half pedal-powered vehicles and half pedal-electric hybrid vehicles. We use the different vehicles depending on the route weight and the terrain. Just as bio-diversity is important to have a healthy ecosystem, diversity of transport options is important for a healthy city.

The U.S. has had a love affair with the automobile, and it's a challenge to break the habit. But the folks at Metro Pedal Power wouldn't be as interested in delivering in trucks. The pedal-powered aspect brings an element of fun, fitness, and empowerment to the otherwise mundane job of delivery driver.

Most of what we deliver is food; both wholesale distribution and also neighborhood route delivery of grocery and produce to individual residences. We work with local farms and small artisan producers. This is a function of the ethics and culture we're working to build. We believe that the health of the economy begins here. Local trade is direct trade, it is fair trade. These engagements are paramount to the health of the community and it reminds consumers of their participatory role in shaping the economy.

Metro Pedal Power has considered many aspects of what is needed for the pedal-powered freight sector to thrive. We have built a small fabrication shop, built vehicle prototypes, and also provided sales and support for other businesses using pedal powered delivery vehicles. One important part of the service we offer is a safety training and road etiquette program, which we have developed. We are working to change the culture on the streets in Boston – we envision the roads as places of shared enjoyment and utility rather than places of conflict, and we are proud that our riders are models for that paradigm shift.

Franklin Jones

B-Line Sustainable Urban Deliveries

As a panelist for this session I provided a short introduction to B-line Sustainable Urban Delivery via a video depicting our operation. The video was a component of a pitch for an investment opportunity and unfortunately the link is no longer live. Should UTRC desire a copy of the video, please let me know.

Following my introduction the panelist all answered the following questions base on our experiences as operators. The List of my responses is below. The conversation was fluid and robust. A limited Q&A session followed the presentation.

Discussion Questions for Roundtable Moderated by Alison Conway

1. Services

Q- What types of customers do you serve (public sector vs. private sector vs. individuals, large vs. small companies, local vs. national/international)?

B2B, primarily local, but represent national w/ OD/Dynamex, and advertising (Clif, Guayaki Brand YM, OVFF, etc.)

Q- Are your deliveries scheduled, on-demand, or a combination of the two?

Our deliveries are scheduled and routed w/ some on-demand depending on customer need. NOT courier dispatched

Q- Do you deliver from a central distribution center, or are your deliveries point-to-point, or a combination of the two?

Operate out of central hub w/ client p/u on the radius - 60%+ routes have backhaul to avoid deadhead

Q- What types of commodities do you move?

Produce, bread, coffee, dry goods office supplies... bicycle parts.... periodicals...beverages. Primarily focus on products w/ high turnover rate... artisan bread = prime example

o Are there markets for which trikes are particularly useful?

All -- but niche is really the mid-size drops (600# divided into 3 or more stops)

o Are there any commodities that are a specific challenge? Why?

Temp controlled. Large weight or volume / stop. Booze (by regulation not b/c of vehicle)

2. Benefits

Q- What types of benefits do you find that trikes offer over motor vehicles?:

o Delivery flexibility? - Time compression, account response time,

o Traffic performance? - really depends on infrastructure - in Portland International Airport (PDX) - ability to maximize total infrastructure. E-assist is key – but limited to state / city regs.

o Parking performance? - HUGE advantage -- also creates win-win for those vehicles who need the reserved loading zones

o Environment/fuel costs? - depends on size of fleet... incrementally stacks up. 80 Tons of CO2 and GHG gasses avoided

Q- Are you able to quantify these benefits?

To some degree... tracking is key. B-line looks to work w/ university to develop more comprehensive model. Clients do request -- thus we are held accountable.

Q- Is this type of information shared with your customers? If yes, how?

Annual report... moving towards integrated invoice.

3. Challenges

Q- What are the greatest challenges that you face?

Greatest challenge may be keeping up with the growing market demand due to supply chain issues -- exist in an emerging market w/o a mature infrastructure / resources

- o Operating trikes in urban areas? (e.g. traffic congestion)

Less of an immediate challenge - at least in PDX. Trikes are large enough to command space on the road and in a dense setting move along at a reasonable clip compared to traffic.... certainly safety is of high concern so we work to mitigate that as much as possible... goal is to right size the transportation landscape

- o Operating this type of business in an urban area? (e.g. costs of space)

Can be significant challenge. However, overall footprint (both physical and in-terms of business expenses - license, vehicle cost, operating and maintenance, etc.) of operation can be smaller and therefore have less overhead and operating expense. Hard for me to judge as I've only run this type of operation. In our cost calculator we found that the numbers support the original assumptions of a sweet-spot in cost savings vs revenue w/ market we serve

4. Regulation

Q- Are your vehicles equipped with an electric-assist?

Yes. On-demand.... variety of systems....

Q- Are trikes considered a bicycle or a motor vehicle in your city/state?

Yes. Three-wheeled. Speed reg. Watt limit. Full use of bike infrastructure.

Q- Do regulations limit your use of specific types of infrastructure? Does this create a challenge to your operations?

Not in PDX - can see this as a challenge and expect to deal w/ this concern in new markets. Particularly e-assist.

5. Community Acceptance

Q- Do you feel that your drivers/vehicles are generally accepted by:

- o Local government
- o Local community groups
- o Local cyclists?

YES - with very few exceptions... we are embraced as part of the PDX "Brand"

Q- Do you perform any outreach to the community?

Advertising, B-shares, BTA support, small biz network, daily presence

Q- Do you receive any financial assistance from the local government/ community?

Yes - a forgivable loan from a regional body and a low interest loan from the City of Portland. Both were instrumental in helping us get more trikes rolling in Portland so that we could prove the model.

Gregg Zuman, Revolution Riskshaws

Revolution Rickshaws

Revolution Rickshaws is a pioneer in city-optimized freight & passenger logistics. Established in 2005, Revolution Rickshaws provides city-optimized transportation services to an array of industry participants requiring city marketing and mobility solutions. Equipment leasing, preventive maintenance, city delivery, garaging, repair, roadside assistance, and consulting services are available today. Tomorrow, our R&D is leading to temperature-controlled cold-chain solutions for perishable products and produce movement within dense urban environments. Revolution Rickshaws: Better Living through Craft Transport.

SESSION 4

POLICY/INCENTIVES/REGULATORY ISSUES

The objective of this last session was to discuss the importance of governance and policy coherence to address the regulatory and policy issues. The session aimed to identify the key concepts, requirements, strategies, challenges that the new programs have to face to achieve good governance at the national level.

The session was moderated by Dr. Camille Kamga, the Director of the University Transportation Research Program. The presenters were

- Adam Lubinsky, WXY Architecture and Urban Design
- Susan McSherry, NYCDOT, Hunts Point Clean Trucks Program
- Alycia Gilde, CALSTART, New York Truck - Voucher Incentive Program

The summaries of each presenter's finding are below.

Adam Lubinsky, WXY Architecture and Urban Design ***Policy and Planning For the Last Mile***

At W.X.Y., we are an interdisciplinary team of planners and architects. The work we do winds up being on a range of scales really from regional planning scales all the way down to a scale of say a water fountain. We've just designed something that will hopefully become New York City's new water fountain-we just installed in a park in Greenpoint. For different scales of work that we do, we have to deal with a lot of different policy and regulatory issues. And so for us, looking at the world of electric vehicles, and electric vehicle charging infrastructure, it becomes a great way for us to begin sort of testing our metal against things that range from what it takes to install something in public space and the kinds of complications that raises all the way up to the larger scale.

So the first work that we undertook with NYSERDA really was a broad project looking at electric vehicle supply equipment across the northeast to the Mid-Atlantic states. The following are three levels of how we tend to look at policy;

- 1- How those basic policy tools begin to effect what we're allowed to do?
- 2- What kinds of incentives we can put in place to encourage people to do things?
- 3- And potentially what we can require people to do?

One of the clusters that we got particularly interested in was looking at fleet and freight. Partly because we knew part of the infrastructure was going to create a need for asking for subsidies. And if you're going to ask for subsidies, you want to subsidize something that can provide real public benefit, and you don't want to subsidize people who can afford electric vehicle cars. And so the fleet and freight side of things became very interesting, and a lot of fleet and freights come from places where there are incredibly high asthma rates. And so targeting fleet and freight became a real environmental justice issue, as well as a broader emissions related issue. So part of the presentation will grow out of our initial NYSERDA work, looking at the fleet and freight clusters, and then move into the discussion of reloading zones. Some of the paradigms around last mile deliveries include:

- 1- road pricing; clearly that can help on the freight delivery side;
- 2- Urban distribution centers which may have been discussed and was alluded to in some of the hub and spoke models for truck freight;
- 3- Individual buildings, there's a lot of policy that's discussed around new construction and what they're required to do;

- 4- Drop off points and;
- 5- the curbside piece which gets into reloading zones.

Urban Distribution Centers

And so as we begin to evaluate the policies and the regulations and the incentives that we want to build around these paradigms, all of which have some validity to them.

So just to walk briefly through some of these paradigms, again building up to the curbside discussion, we've done things like urban distribution centers, which exist in many different forms and have many different names. If you're from European countries, the U.K., you might call them consolidation centers. There are things like freight villages that exist in another form. So depending on where things are sited, they have different kinds of benefits. But broadly speaking, they can reduce congestion, pollution, noise and fuel consumption. The Challenges to create those distribution centers include:

- Capital / operational
- Additional handling stage in the supply chain
- Security / liability
- Customer Service Issues

Individual Buildings

The Midtown east, the rezoning there, a lot of discussion about how these big new floor plates are going to sit in the city block, and how the problem of deliveries can be solved with these big new buildings. There has been a number of suggestions about building internal loading areas and requiring internal loading areas in buildings with the benefits of:

- Put freight vehicles out of site
- Increases on-street parking space
- Safety of delivers
- Potential for storage and other

But in doing so, there are following challenges:

- Impairs street-level environment/ interface
- Reduced usable building space – esp. ground floor retail
- Large vehicle maneuvering
- Lacks flexibility for future change

Drop-off Points

So there's another paradigm that is beginning to take shape, and in some ways it's a paradigm that picks up where post offices have left off which are drop off points. And Amazon, some of you may be familiar with, has started to set up lockers in different kinds of pharmacies or bodegas or small stores where the stores may get a little rental fee and they may get a little bit more foot traffic to sell their goods in return for hosting Amazon lockers. You could have and really encourage through policy drop off points in commercial venues and they would benefit along the way. The benefits of Drop-off points are:

- Avoids congestion caused by deliveries on residential streets
- Provides convenience to residents in buildings without doormen
- Creates foot traffic for stores

But to do so, our challenges are:

- Creating the right business partnerships
- Conflicts with existing store usage

Curbside

So that takes us to the curbside perspective and curbside; the curbside opportunities are many folds. The benefits include:

- Easy access to delivery points
- Use existing infrastructure for electricity - e.g. street lamps
- Manage congestion & blocked lanes

Of course managing curbside space comes with all sorts of challenges;

- Pedestrians in the way
- Public transportation (Bus stops, bus shelters, subway entrances)
- Bicycle Lanes
- Taking away public space
- Street furniture – conflict with
- Impacting traffic patterns

In terms of the different kinds of policy incentive pieces that can be put in place for curbside uses, there is an opportunity to encourage and put in place space for alternative freight vehicles and send them on to the freight trike folks.

There are potentials to utilize all sorts of new technologies in optimizing how loading and unloading is conducted. There are policy measures that relate to off hour deliveries that can really help to regulate when things come in and minimize congestion as a result during night time deliveries for an example. And many of you will be aware of Streetline, which is a new technology that is being embedded at curbside so people can find out if there's parking space available so it minimizes circling. This technology can also be used for truck loading zones as well.

Green Loading Zones

So that brings us to green loading zones which again is just one part of one of the many paradigms to deal with the last mile situation. In essence, the idea is to prioritize electric vehicle trucks in new or existing loading zones for certain times of the day. And it's a concept we've been working on with Paul Lipson and Paul Soloma who are here, and another group called Energetics. It's an idea we are working on with NYSERDA and working to encourage agencies in New York to look at critically in different places within the city. It might not work with in all areas of the city, so that fleet owners are incentivized to go out and purchase electric vehicle trucks. Now if you talk to anybody who owns or operates commercial fleets, they will tell you that they spend a huge amount of time circling, looking for loading zones to pull up and deliver from. They emit a lot of carbon during that time and they also end up paying a huge amount in parking tickets. So the ability for them to take the funds that they spend on parking tickets and convert that into electric trucks it's pretty promising actually having spoken to a number of them.

As mentioned earlier, the purpose of the green loading zones is really to target trucks and not cars and in many ways to tie it back to the public benefit it's about air quality issues. We see this as a simpler approach than constructing low emission zones like they have in London which is very important policy but a very difficult one to get across. And we see that as something that may have charging equipment there for the trucks or it may simply be a policy mechanism to get them to come to these spaces.

Susan McSherry, NYCDOT

Hunts Point Clean Trucks Program

The Hunts Point Clean Trucks Program is a first-come, first served voluntary clean trucks program initiated by the New York City Department of Transportation (NYCDOT) to provide rebate incentives to truck owners that are based and/or operate regularly in the South Bronx communities of Hunts Point and Port Morris. The Program offers excellent rebate incentives for the use of advanced transportation technologies and alternative fuels. Truck owners can take advantage of available funding to help them replace their older truck with a new 2010 EPA

emission compliant diesel truck or a new 2010 alternative fuel vehicle. Funding is also available for the installation of exhaust retrofit technologies or vehicle scrappage.

To promote “Cleaner Trucks for a Greener South Bronx,” the Hunts Point Clean Trucks Program aims to replace and improve the emissions of up to 500 older diesel trucks that frequently serve the food distribution facilities and local business in Hunts Point and Port Morris. NYCDOT and its Project Partners, Tetra Tech Inc., Gladstein Neandross & Assoc., Integrated Strategic Resources, and Accion, will collaborate with the trucking and local communities to evaluate the cleanest truck options that will not only be more cost effective, but will also promote clean air, public health, and a prosperous South Bronx. To be eligible the participant must:

- currently own a Class 3 to Class 8 diesel truck equipped with an engine Model Year (MY) 2006 or older and provide proof of service to Hunts Point and/or Port Morris communities for one (1) year
- Scrap old truck when replacing with a diesel truck with an engine MY of 2010 or newer
- Scrap or retrofit old truck (engine MY 2003 and older) when replacing with an alternative fuel truck
- Commit to the Program for five (5) years
- Be domiciled and/or regularly operate in Hunts Point or Port Morris

The new or retrofitted Replacement Truck must meet and maintain the following requirements each year of the program:

1) 60 percent of the total vehicle miles traveled (VMT) must be within the New York City area (red areas); and visit the Hunts Point and/or Port Morris area at least two (2) times per week OR

2) 85 percent of the total VMT must be within the Nonattainment Areas of the following New York State Counties: Bronx, Kings, New York, Queens, Richmond, Nassau, Putnam*, Rockland, Suffolk, and Westchester (red and orange areas), and must operate within the Hunts Point and/or Port Morris communities at least three (3) times per week.

As of June 2013, the Hunts Point Clean Truck Program has replaced 204 trucks, and scrapped 22, and has produced the following estimated emission reduction benefits: NO_x – 88%; PM_{2.5} – 97%; HC – 86; CO – 80%; CO₂ – 22%.

Alycia Gilde, New York Truck - Voucher Incentive Program

CALSTART

CALSTART is a national non-profit organization that specializes in coming up with clean transportation solutions and looking at how they can create partnerships and opportunities for outreach to educate fleets to be more economical, and also reduce their carbon footprint. CALSTART has an initiative called the High Efficiency Truck Users Forum. It’s a national program they’ve conducted to build relationships with their fleet partners to exchange information on best practices, talk about the technologies that are out there, and also talk about the incentives to help them purchase clean alternative fuel vehicles.

California has been a progressive state in advancing clean air technologies, clean vehicle technologies and also developing stringent air quality standards, but they’ve also been very effective in providing incentive programs to help spur the adoption of alternative fuel vehicles. For example, about 55 million dollars to date has been spent

on helping to advance alternative vehicles in California. In New York State, there are 19 million dollars available for alternative vehicle and Chicago is going to be launching a program quite soon as they have 14 million dollars for alternative fuel vehicles and infrastructure. In California, in 40 months, they spent 44 million dollars on alternative fuel vehicles. They're looking at medium to heavy duty diesel vehicles that are being replaced with freight cleaner alternatives for the state, and it is making an improvement on the air quality within the state. To give an idea, 37 percent of the national hybrid truck sales have taken place in California through these incentive programs. 75 percent of the national electric truck sales, 3 hundred and 80 trucks, have been in California.

New York is going to be the next state leading the way in advancing alternative fuels with \$19 million fund available for 3 years, funded through the Federal Highway Administration. It's a partnership with NYSERDA, NYCDOT, NYSDOT, and the CALSTART team. This program is similar to the Hunts Point Clean Trucks Program. They're trying to get everybody engaged that has any investment in clean vehicle technology. They're reaching out to the Original Equipment Manufacturer (OEMs). What they're trying to do is they're working with alternative fuel vehicle OEMs that provide these clean technologies. They want to work with them to get them approved for the program, and also have the ability to market these technologies through the program to the end user; to the fleets. NYSERDA is working with Vendors and fleets to educate and engage them in this program.

They have the New York State Electric Vehicle Voucher Incentive Program. They have the New York City Alternative Fuel Voucher Incentive Program and they have the New York City Diesel Emission Reduction Voucher Incentive Program. On August 8th, they've launched the New York State Electric Vehicle Voucher Incentive Fund. They have 9 million dollars available right now for Class 3 to Class 8 vehicles for looking at a vehicle with a Class weight of 10 thousand and 1 pounds and higher. They're allowing municipalities, public entities, private, and non-profit fleets to participate in this program. They're creating more flexibility in terms of who can participate. Typically NYSERDA's programs have been private fleet only, so this is a great opportunity for public and municipality entities to participate as well. They're targeting, for this particular program, 30 counties and a map was shown to show the different counties that are eligible for this program. Fleets that are operating 70 percent of the time, that are also garaged and domiciled in these 30 counties, can participate. This is the program for the 5 boroughs of New York City only. Again they're targeting Class 3 to Class 8 trucks. This is for private and non-profit fleets only. And again they want to see the activity of the vehicle operations within the 5 boroughs of New York City. Lastly, they have a program in which they have 4 million dollars available for after treatment technologies. This is addressing the tailpipe emissions. It doesn't provide any real efficiencies for the vehicle, but it is a great opportunity to reduce emissions from the tailpipe of diesel trucks. And again this is targeting the 5 boroughs of New York City. They want to see the benefits stay within the 5 boroughs, and the vehicles have to demonstrate 70 percent of the time operating in the 5 boroughs.

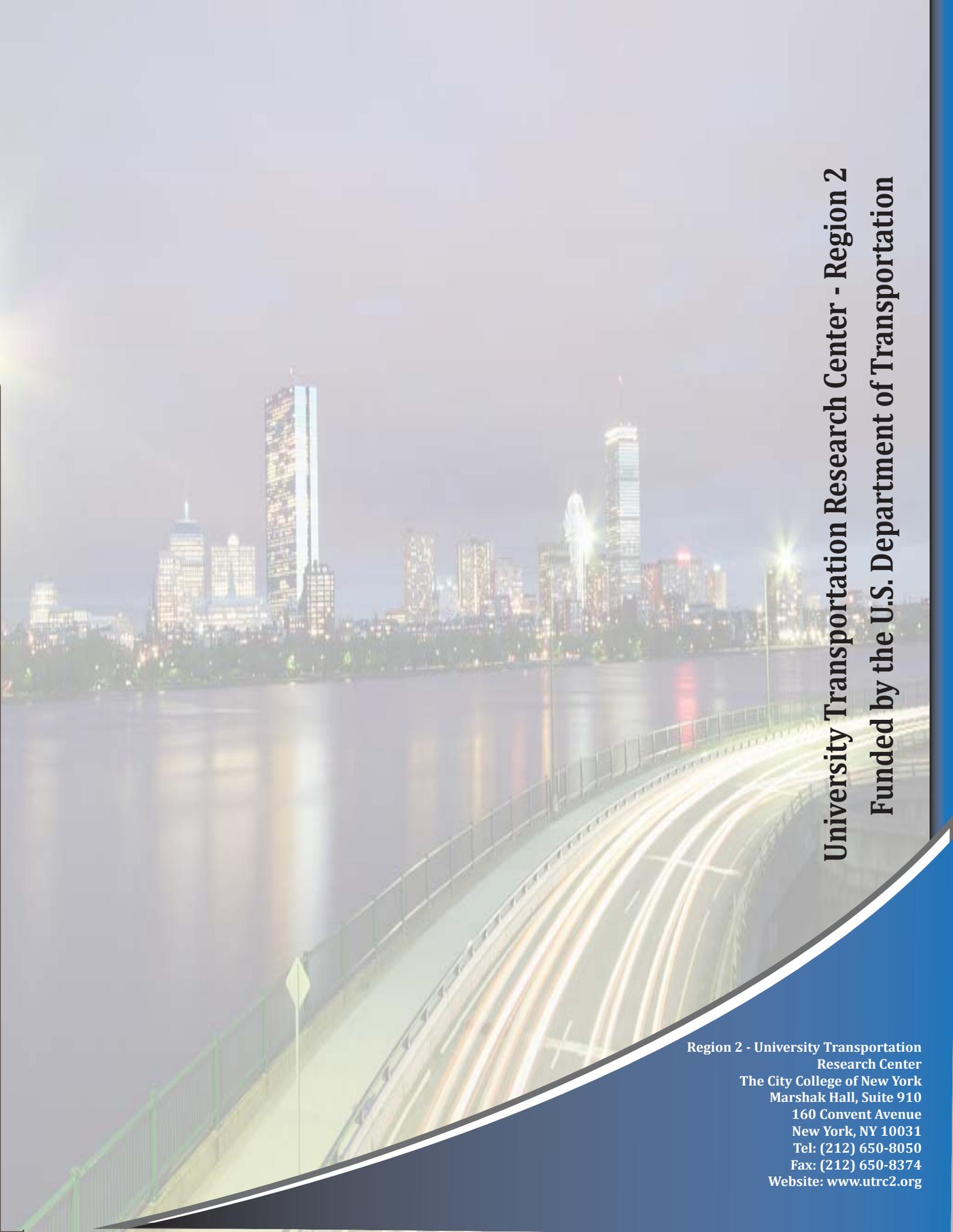
The whole idea of outreach is important. Another important component of this program is the compliance requirement. You have to operate for 3 years within that non-obtainment area, but they're also going to be asking for fleets to provide semi-annual reporting. They want to know how they're doing. They want to understand how many miles they're traveling on an annual basis. How much fuel they're consuming or how much fuel they're displacing. They want to know some of the technical challenges.

Why vouchers over tax incentives and other options? It's a very simple way of providing incentives and reduces all of the paperwork, making it more efficient to get these cleaner vehicles out on the market. Fleets can take advantage of it. It's an easy way to get through the process to make the order, it's easy to understand, and they're getting feedback from the industry. They're looking at opportunities at how we can further develop incentive

programs to help drive the market for alternative fuel vehicles. They're finding that CMAQ funds are a very good way of providing incentives for clean transportation technologies. The Hunts Point Clean Trucks Program is a CMAQ funded program. The Chicago program is also CMAQ funded.

CLOSING REMARKS

Dr. Camille Kamga delivered the closing remarks by thanking all of speakers and mentioning that they did a really fantastic job. He also thanked UTRC and IST staff for the conference organization. He expressed his special gratitude to sponsors; NYSERDA and NYSDOT for providing funds for the event. He said that the proceeding of this conference, one of the requirements from NYSERDA, will be available soon on UTRC's website. He closed his remarks by pointing to the last listed item on the conference program, a demonstration of the Duane Reade truck on twenty-fourth street between Third Avenue and Lexington Avenue.

A long-exposure photograph of a city skyline at night, reflected in a body of water. In the foreground, a bridge or highway is visible with light trails from moving vehicles. The sky is dark, and the city lights are bright and colorful.

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