NYSERDA TRANSPORTATION PROGRAM CASE STUDY:

Transportation Demand Strategies at the Buffalo Niagara Medical Campus

Final

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NYSERDA Contract 32883 September 2016

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1. Introduction

In 2013, New York State's transportation sector consumed more than 1,032 trillion Btus of energy, or 43 percent of the total energy consumed in the state. Approximately 92 percent of transportation energy consumption came from petroleum products. As a result of its reliance on the combustion of petroleum products, New York's transportation sector was responsible for 75 million metric tons of CO_2-equivalent emissions in 2013, or 42 percent of all fuel-borne greenhouse gas emissions in the state.[1]

Within this context, NYSERDA's Transportation Program has identified several objectives:

- To reduce and diversify the energy consumed by the transportation sector;
- To minimize greenhouse gas emissions; and
- To create economic development opportunities in New York State.[2]

The current Transportation Program builds on decades of research conducted with state and federal funding. Beginning in 2016 with the transition to NYSERDA's Clean Energy Fund (CEF), the Transportation Program adopted three focus areas: electric vehicles, public transportation, and mobility management. The project described in this case study – Transportation Demand Strategies at the Buffalo Niagara Medical Campus (BNMC) – aligns with the mobility management focus area. TDM is broadly defined as the use of strategies to increase transportation system efficiency, typically by reducing single-occupant vehicle (SOV) demand or redistributing that demand in space or time.

In 2012, BNMC received funding from NYSERDA through a joint program with the New York State Department of Transportation (NYSDOT) to create a Transportation Management Association (TMA) focused on reducing SOV use and promoting alternative transportation among employees. BNMC is a complex of nine medical, educational, and research institutions in downtown Buffalo. The campus currently has approximately 12,000 employees, but is expected to grow to 17,000 employees by the beginning of 2017. To address increasing parking shortages associated with its rapid growth, BNMC worked with NYSERDA and NYSDOT to create a TMA that would advance TDM strategies in a holistic way across the campus.

NYSERDA provided $120,999 in funding to BNMC to establish the TMA and carry out one year of TDM strategies. BNMC wanted to manage transportation demand holistically, so the campus considered a range of strategies, which were informed by a 2010 study of transportation habits and needs at BNMC. The advocacy and coordination efforts of the TMA at BNMC supported TDM efforts throughout the greater downtown Buffalo community as well.

[1] NYSERDA. 2015. Patterns and Trends – New York State Energy Profiles: 1999–2013. October 2015. Available at: http://www.nyserda.ny.gov/About/Publications/EA-Reports-and-Studies/Patterns-and-Trends.

[2] NYSERDA. 2015. Transportation Program: Product Development, Product Demonstration, and Product Deployment, Program Theory and Logic Model Report. August 2015.

Strategies Employed by the TMA at BNMC:

- "Rideshare" programs (e.g., carshare, bikeshare, carpool) accessible throughout the campus.
- Subsidized Niagara Frontier Transportation Authority (NFTA)-Metro bus and rail passes intended to encourage BNMC commuters to take public transit.
- Guaranteed Ride Home taxi vouchers for employees taking public transit.
- "GObike Buffalo" rewards program for bicycle commuters.
- Transportation planning support for BNMC member institutions.
- On-campus parking fees intended to discourage SOV use.
- A "one-stop-shop" website that provides information to BNMC employees on TDM options.

Strategies Adopted by Partners in Greater Downtown Buffalo:

- Two new NFTA-Metro Express bus routes in communities without adequate public transit options.
- Additional bicycle lanes and bicycle parking throughout downtown Buffalo, to support increased bicycle commuting.

BNMC's final project report indicates that the TMA's efforts had immediate impacts, as shown in Exhibit 1. For instance, single-occupancy BNMC commuters decreased by 5.6 percentage points from 2012 to 2013, according to BNMC's end-user surveys.[3] In addition, the BNMC parking system currently operates at approximately 70 percent capacity despite rapid growth in recent years.[4, 5]

Exhibit 1. BNMC's Reported Results from TDM Efforts

Commuting Mode	2012 Share	2013 Change
Drive alone	88.4%	-5.6%
Carpool	4.6%	+3.6%
Public transit	4.0%	+1.4%
Bike	0.7%	+0.6%
University at Buffalo shuttle	0.4%	no change
Walk	1.8%	no change
Annual reduction in vehicle miles traveled (VMT)		2,555,000 miles
Annual CO_2 reduction		2,057,000 pounds

This case study does not attempt to validate these outcomes, but instead focuses on progress since 2013. Exhibit 2 provides additional detail on the focus of this case study. In particular, the primary intent is to understand the market development impacts of the project, including benefits achieved to date and the potential for future benefits in other market segments or applications.[6]

[3] NYSERDA. 2013. Advancing Transportation Demand Management Strategies at the Buffalo Niagara Medical Campus - Final Report. November 2013.

[4] Buffalo Niagara Medical Campus. 2015. BNMC Access. August 2015. Available here: http://www.bnmc.org/bnmc-access-principles/

[5] BNMC is considering whether a portion of this decrease in on-campus parking may be the result of a corresponding increase in on-street parking in the surrounding residential areas.

[6] This case study is part of a suite of six case studies with an overall purpose of: (1) highlighting important transportation research and development accomplishments in New York State; (2) understanding the role that the Transportation Program played in

Exhibit 2. Evaluation Scope

Evaluation Question	Data Sources and Analytic Methods
1. To what extent did the TMA's activities continue after the end of NYSERDA's initial support?	• Review of the information provided by BNMC to NYSERDA as part of NYSERDA's standard follow-on reporting requirements • Internet research to assess the current status of programs and initiatives discussed in BNMC's final report • Interviews with BNMC's transportation planner and two representatives from partner organizations (Shared Use Mobility Center and Shared Mobility, Inc.)
2. Which TDM strategies employed at BNMC are likely to be most replicable and impactful at other workplaces?	• Interviews with two representatives from partner organizations (Shared Use Mobility Center and Shared Mobility, Inc.) • Interviews with Dr. Yeganeh Hayeri, an expert in TDM deployment • Verification of findings using market research and information provided by NYSDOT
3. What benefits – beyond financial - did NYSERDA contribute to the project?	• Review of the information provided by BNMC to NYSERDA as part of NYSERDA's standard follow-on reporting requirements • Interviews with the BNMC's transportation planner and the NYSERDA project manager

The following sections of this report discuss the evaluation questions, methods, and findings in detail. Section 2 summarizes the results of the case study analysis for each of the three evaluation questions listed in Exhibit 2. Section 3 then examines the strategic implications of those findings, including the potential for successful TDM projects in new markets or applications, effective approaches that NYSERDA can build on, and remaining barriers to TDM adoption that NYSERDA could address. Section 3 also proposes "leading indicators of success" – or short-term metrics that indicate a project is likely to achieve long-term goals – that NYSERDA could use to evaluate future TDM projects.

achieving those outcomes; and (3) informing Transportation Program strategy by identifying effective approaches that NYSERDA can build on and remaining market barriers to address.

2. Project Outcomes

The following three sections discuss each of the three evaluation questions in detail. First, Section 2.1 highlights the extent to which BNMC and the City of Buffalo have successfully adopted TDM strategies, maintaining or expanding upon the benefits documented in BNMC's 2013 final report to NYSERDA. Section 2.2 then discusses the potential for similar TDM efforts to succeed in other locations around New York to inform NYSERDA's Transportation Program strategy. Finally, Section 2.3 describes NYSERDA's contribution to the success of the project.

2.1 Continuation of TMA's Activities

A central focus of this case study was the extent to which the outcomes detailed in BNMC's 2013 final report were maintained or expanded since the first year after implementation. Based on interviews with BNMC's transportation planner and two representatives from partner organizations (Shared Use Mobility Center and Shared Mobility, Inc.), review of NYSERDA's project files, and supplemental research into BNMC's and Buffalo's TDM offerings, IEc found that nearly all of the strategies employed by the TMA are continuing. In addition, several of these strategies have been expanded in scope without NYSERDA funding, as shown in Exhibit 3.

With regard to BNMC's central goal of reducing SOV travel, BNMC's transportation planner noted that current SOV use levels likely have not changed substantially from those documented in the 2013 final report. BNMC has not conducted a follow-up employee survey to verify this, however. In addition, BNMC's long-term goal (approximately 75 percent drive-alone mode share) remains unchanged, as BNMC has not yet achieved this goal. According to BNMC's transportation planner, the slow reduction in SOV use in recent years may be in part due to NFTA's replacement of the rail system track bed near BNMC. During construction, the TMA has temporarily de-emphasized its public transit marketing. Marketing and subsequent non-SOV use are expected to increase once this construction is complete.

Exhibit 3. Status of BNMC's TDM Strategies

Strategy	Status
Bikeshare	Continued same scope without NYSERDA funding
Carshare	Continued same scope without NYSERDA funding
Carpool Programs (e.g., preferred parking spaces, group payment accounts)	Continued same scope without NYSERDA funding
NFTA Metro Express Bus Routes	Continued same scope without NYSERDA funding
Alternative Transportation Incentive Programs (e.g., discounted transit passes for new riders, SmartCard access)	Expanded scope with funding from NYSDOT through a joint program with NYSERDA
Guaranteed Ride Home Taxi Vouchers	Continued same scope without NYSERDA funding
"GObike Buffalo" Community Membership and Rewards Program	Continued same scope without NYSERDA funding
Improved Bicycle Routes and Infrastructure	Expanded scope with funding from NYSDOT through a joint program with NYSERDA
Parking Management	Expanded scope with funding from NYSDOT through a joint program with NYSERDA

Strategy	Status
Transportation Assessment Program for BNMC Member Institutions	Unclear of status/unable to verify
Marketing and Website	Expanded scope without NYSERDA funding
Zoning and Land Use Change	Added to TDM with NYSERDA and other funding

Other efforts that have continued or increased since 2013 include the following:

- **Alternative Transportation Incentive Programs:** The TMA at BNMC continues to offer financial incentives, such as discounted transit passes for new riders, to encourage employees to select alternative transportation. Since 2013, BNMC has begun the process of implementing a SmartCard system, which will provide employees with a single access card and means of payment for the citywide NFTA-Metro rail and bus, University at Buffalo shuttle services, local carshare and bikeshare fleets, and bicycle storage facilities. The SmartCard system is expected to be integrated by NFTA by the end of 2017.

- **Improved Bicycle Routes and Infrastructure:** The TMA continues to expand and improve bike infrastructure throughout downtown Buffalo. Specifically, the City of Buffalo has made a public commitment to add 10 miles of bicycle lanes to city streets every year, starting in 2013, as part of a long-term effort to improve the economic and residential quality of life in the city. By the end of 2013, downtown Buffalo had added 11.3 miles of bike lanes.[7] Currently, expansion plans are in place so that the city will have added 90 miles of new bicycle lanes by the end of 2016.[8]

- **Parking Management:** Under the initial NYSERDA funding, the TMA encouraged BNMC's member institutions to eliminate free parking and increase parking fees to reflect market prices. While this has reduced SOV use by commuters, the increase in on-campus parking fees has also unexpectedly led to an increase in employees parking, for free, on the streets of the adjacent Fruit Belt neighborhood of Buffalo. To more effectively discourage SOV use, the TMA subsequently advocated for the state legislature to allow the City of Buffalo to create a residential permit parking program to restrict free street parking. Legislation granting the City that authority was passed and signed into law in July 2016.[9]

- **Marketing and Website:** The TMA markets its TDM offerings under the brand "GO BNMC." Since 2013, the TMA has improved its website so that it now serves as a "one-stop-shop" where employees can sign up for multiple transportation services offered by BNMC and its partners.

- **Zoning and Land Use Change:** Related to its efforts to improve bicycle routes and infrastructure, the TMA continues to connect with key partners to promote land use change for urban redevelopment. The TMA is currently collaborating with the City of Buffalo to

[7] GOBike Buffalo. 2015. Complete Streets. Available here: http://gobikebuffalo.org/programs/complete-streets/

[8] GoBike Buffalo. 2016. Buffalo Bicycle Master Plan Update. Spring 2016. Available here: http://www.city-buffalo.com/files/1_2_1/Mayor/Buffalo_BMP_Update.pdf

[9] City of Buffalo. 2016. Fruit Belt Parking Permit Program. Available here: https://www.city-buffalo.com/Mayor/Home/Leadership/PublicRelations/Press_Releases/FruitBeltParkingPermitProgram

strategically redevelop the downtown area to promote "complete streets," which are streets designed and operated to enable safe access to all pedestrians, bicyclists, motorists, and transit riders. "Complete streets" promote walkability, biking, and the use of public transit, dovetailing with BNMC's efforts to encourage alternative modes of transportation.

Although the TMA has achieved notable results to date, BNMC's transportation planner and two representatives from partner organizations (Shared Use Mobility Center and Shared Mobility, Inc.) noted that key policy barriers are limiting further progress. Most significantly, state legislation had limited the ability of the City of Buffalo to establish residential parking permit programs. Although the enabling legislation passed in July 2016, the permit system and fee structures have yet to be established. State legislation also prevents residents from using certain TDM strategies, such as electric assist bicycles (e-bikes) and ridesourcing (e.g., Lyft, Uber), that have the potential to help address commuters' concerns over "last mile" connectivity (i.e., travel from a public transportation hub to the final destination). To address these barriers, the TMA, separately from strategies pursued under NYSERDA funding, has established key partnerships with the City of Buffalo and other transportation-focused organizations to advocate for change through the state legislature. In the case of the Fruit Belt residential parking permit program, this advocacy appears to have been successful.

In addition, the resource-intensive nature of employee surveys limits the amount of information that the TMA has access to for planning, marketing, and evaluating its programs. The TMA does strive to regularly solicit feedback on its programs, although detailed surveys are rare.

2.2 Replicability of the TMA's Strategies

Because of the large scale and interconnected nature of its transportation networks, BNMC approached TDM holistically, rather than as a series of individual interventions. This, combined with the fact that these programs are still relatively new, meant that our analysis considered the extent to which the *process* employed by the TMA could be replicated to increase transportation efficiency elsewhere. Of the strategies employed by the TMA to implement the suite of programs, the most replicable and impactful are likely to include:

- **Engaging Partners Early in the Process:** BNMC's transportation planner, the NYSERDA project manager, and NYSDOT materials all noted that establishing partnerships with influential stakeholders early in the process is essential to creating and expanding TDM efforts.[10] The TMA at BNMC could not directly control the transportation policies, services, or infrastructure used by employees, so BNMC invited a diverse set of stakeholders to become involved with the creation of the TDM program. These stakeholders included the local metropolitan planning organization, local advocacy groups, NFTA, and BNMC management. According to BNMC, these early partnerships allowed stakeholders to freely share ideas and address concerns before implementation. BNMC's program manager cited this early stakeholder engagement as critical for minimizing opposition among parties with the authority to influence transportation policies, services, and infrastructure.

  Interviewees also emphasized the need for early engagement from facility management, as well as the need for an internal champion willing to advocate for the TDM program. This need is

[10] NYSDOT. 2013. ATDM Best Practices Scan and Assessment: Technical Memorandum #2. November 2013.

exemplified in the results of TDM efforts attempted elsewhere. For instance, NYSERDA attempted to pursue a similar TDM program at another New York State health care facility, but ultimately fell short of its goals due to lack of internal support at that facility.

- **Using Data to Identify Target Populations:** Cost-effectively decreasing SOV use requires the adoption of public transportation, biking, and shared modes of mobility by a critical mass of people. Of its 12,000 employees, BNMC specifically targeted those with consistent schedules living within walking distance (up to two miles) from a public transit route. Targeting employee groups based on commute distance, potential commute route (e.g., flat terrain for biking, safe streets), and workplace schedules can help to ensure that TDM strategies are adopted quickly.

- **Offering a Flexible and Diverse Portfolio of TDM Programs:** All interviewees and various research documents noted that a diverse portfolio of TDM programs should be offered to encourage employees to explore new transportation options and to ultimately change transportation behavior.[11] Together, BNMC and the City of Buffalo supported and encouraged the use of many alternative transportation options (e.g., carpool, bus, carshare, bikeshare) and invested in new infrastructure (e.g., adding bike lanes).

- **Ensuring Public Safety:** BNMC's transportation planner and an expert in TDM deployment noted that confidence in public safety is essential for the adoption of alternative modes of transportation. BNMC employs foot patrol officers to promote public safety across campus, which should in turn empower employees to walk, bike, or take public transit.

Short-Term vs. Long-Term TDM Strategies

TDM strategies can address both short-term and long-term objectives. Literature on best practices for TDM programs suggests several short-term strategies that could supplement the ongoing activities at BNMC:

- Telecommuting (when possible)
- Real-time travel data (e.g., transit trackers, traffic updates)
- Centralized technology platforms for TDM programs (e.g., carpool matching platforms)

In the long term, effective strategies can include:

- Land use and compact development planning
- Policies that support job access and transportation affordability for all segments of the population

While these specific short- and long-term strategies were not addressed under the initial NYSERDA grant, BNMC has since begun incorporating land use and compact development planning through the BNMC Green Commons Initiative, under a separate grant from the NYSERDA's Cleaner, Greener Communities Program.

2.3 Benefits of NYSERDA Support

Interviews with BNMC's transportation planner and the NYSERDA project manager and a review of NYSERDA's program materials confirmed that NYSERDA offered both financial and non-financial

[11] NYSDOT. 2011. New York State Travel Demand Management Program Analysis - Statewide TDM Framework - Key Issues/Potential Solutions. August 2011.

support to the TMA, and both of these avenues of support had benefits to the project. The two key non-financial benefits provided by NYSERDA were:

- **Connecting BNMC with TDM Partners:** NYSERDA was able to connect BNMC with key players in the TDM space. In particular, rideshare platforms like Buffalo CarShare (since acquired by Zipcar) and GObike Buffalo were brought into the process through NYSERDA contacts, and helped the TMA advance its strategies at BNMC.

- **Allowing BNMC Flexibility to Experiment:** The funding that NYSERDA provided was critical in allowing BNMC to explore TDM strategies and determine an appropriate portfolio of projects for the campus. This flexibility helped BNMC optimize its approach for the many external factors (e.g., policy, behavioral) that are known to affect TDM success. For example, the TMA realized that the Guaranteed Ride Home program was rarely used but provided valuable peace of mind to potential public transit users; as a result, the TMA continued funding the program despite its relatively low level of use. The information and feedback the TMA collects from BNMC employees and member institutions is used to focus future investments and to identify areas for potential expansion.

  Importantly, BNMC's initial results also demonstrated to other stakeholders that TDM strategies can – and do – improve transportation efficiency. This demonstrated success motivated other stakeholders throughout the City of Buffalo to subsequently become involved with TDM strategies.

Despite its early success, BNMC's TDM program is not yet financially self-sustaining, although BNMC has established a general fund to support TDM activities. Revenues from parking fees, membership dues, and fees for services cover a portion of the costs of incentive programs and capital investments; in the future, BNMC intends to establish a revolving fund that may include NFTA, the regional Department of Transportation, and/or the Greater Buffalo Niagara Regional Transportation Council. At this time, however, expansions in the TMA's programs require additional funding. Recognizing this limitation, the TMA has used the success of the initial NYSERDA grant to leverage additional funding and to create and maintain partnerships with partner organizations in Buffalo. For example, BNMC recently received $1 million from NYSERDA's Cleaner, Greener Communities Program and additional funding from the Federal Transit Administration and NYSDOT to create an Integrated Mobility Hub where employees and residents can access and learn about an array of alternative transportation services in a centralized and highly accessible location. The Hub will house an indoor bike parking facility and community bike workshop operated by GObike Buffalo, store carshare and bikeshare fleets, and serve as an outreach and education center for the regional "GO Buffalo Niagara" transportation initiative.

2.4 Overall Results

Overall, BNMC was successful at achieving its TDM objectives. BNMC's original, narrow intent was to reduce SOV use, principally as a parking management mechanism to avoid the need to expand parking facilities. According to BNMC's final report and website, the percentage of employees driving alone decreased from 88.4 percent in 2012 to 83 percent in 2013, and BNMC's parking system operated at around 70 percent capacity in 2014. BNMC's transportation planner indicates that these changes have been maintained, although a follow-up survey has not been completed to verify employees' commuting

behavior. Three years after the initial NYSERDA grant ended, BNMC's TDM program is still in operation and is focusing on the most successful of its strategies, as well as expanding and leveraging additional resources to address a wider range of issues. Specifically, BNMC is now collaborating with the City of Buffalo to reduce the regional impact of transportation.

As the TMA expands its efforts to the greater downtown Buffalo area, the focus of its TDM strategies should – and has – evolved to include city-wide redevelopment. For example, ensuring affordable housing downtown allows employees the flexibility to live closer to work, thus encouraging the use of alternative transportation. The TMA is currently working with other stakeholders to develop an integrated approach to redeveloping the downtown area with TDM in mind. One such strategy underway is the introduction of a residential parking permit program to restrict free street parking and further discourage SOV commuting. The TMA is also working with the City of Buffalo to add bike lanes throughout the city.

In addition, building on the success of the BNMC TMA, NFTA recently received NYSDOT funding to establish a TMA for the Buffalo-Niagara region. This TMA will work to advance TDM in the Buffalo-Niagara region by demonstrating the effectiveness of reducing vehicle miles traveled (VMT) through increased mobility options. The regional TMA will replicate and scale up proven TDM strategies deployed by BNMC to highlight the effectiveness of TDM to other large employers, institutions, and municipalities.

Exhibit 4. Results Summary

Progress Achieved	Gaps in Achievement
Evaluation Question 1: To what extent did the TMA's activities continue after the end of NYSERDA's support?	
The TMA continues to operate, and several aspects of the TMA's strategy have expanded since 2013: • Alternative transportation incentive programs • Improved bicycle routes and infrastructure • Parking management • Marketing and website • Zoning and land use change	Two key areas of the TMA's strategy remain underdeveloped: • Need for a residential parking permit program adjacent to BNMC (recently approved by the state legislature; development underway) • Ridesourcing programs, like Lyft and Uber, and e-bikes are restricted in NYS
Evaluation Question 2: Which TDM strategies employed at BNMC are likely to be most replicable and impactful at other workplaces?	
Strategies employed by the TMA can be expanded and applied to TDM efforts elsewhere. Strategies include: • Establishing key partnerships • Targeting a critical mass • Offering a diverse portfolio of TDM programs • Ensuring public safety	Additional short-term and long-term TDM strategies can supplement ongoing options: • Short-term: Promote telecommuting if job allows and continue to improve technology to ease use of non-SOV options • Long-term: Integrate TDM efforts with land use planning and address job access and transportation affordability
Evaluation Question 3: What benefits – beyond financial - did NYSERDA contribute to the project?	
NYSERDA's support and funding provided benefits to the TMA at BNMC. Examples of benefits include: • Connected BNMC with key players • Allowed BNMC flexibility	NYSERDA's support did not, however, lead to the creation of a self-sustaining TDM program: • Resources are required to keep TDM strategies in place and improve the program

3. Strategic Implications

Our review of the TDM strategies employed at BNMC, as well as other TDM programs and guidance documents, indicates that there are several effective approaches NYSERDA can build on for future projects. To best support communities interested in pursuing comprehensive TDM strategies, NYSERDA should:

- **Support a flexible portfolio of TDM offerings:** There is no single portfolio of TDM offerings that will guarantee success in TDM deployment since the success of various efforts depends on geographic factors and local transportation patterns. As at BNMC, time and resources will be required for communities to try different TDM approaches to determine the appropriate portfolio of strategies to pursue. In supporting future TDM projects, NYSERDA can work with communities to build a diverse and flexible portfolio of TDM offerings that:
    - Aligns commuters' incentives to try alternative modes of transportation,
    - Provides the necessary infrastructure for alternative transportation,
    - Engages in targeted marketing campaigns,
    - Supports long-term land use planning, and
    - Uses technology to ease the transition to alternative transportation.

  Of note, one interviewee suggested that bikeshare can be a valuable "introduction to TDM" in areas that may lack community knowledge or existing transportation options and infrastructure, since it requires a lower level of buy-in and flexible infrastructure, does not impose additional cost on commuters, and can lay the groundwork for expanding awareness and building a culture of shared mobility. This "beachhead" approach contemplates a long-term, incremental progression toward TDM that is different from BNMC's approach, but may be an effective approach in less densely-populated areas.

- **Focus on communities with ability to build key partnerships:** Among communities interested in pursuing TDM, NYSERDA should focus on working with communities that can create partnerships with multiple stakeholders such as public transit authorities, local advocacy groups, and top-level management. A community should have buy-in from local decision-makers who can influence transportation policy before pursuing TDM. TDM strategies are also likely to be more successful in communities with good public safety records and a sufficient number of commuters living near public transit.

- **Rely on data-driven analysis to promote behavior change:** As noted above, the success of specific TDM offerings will vary from site to site and may require iteration and experimentation. To identify the most effective strategies for a given site, communities should design their programs to optimize both data collection and VMT reductions (or other desired benefit). This could mean, for example, surveying commuters at multiple times during the project, testing

different marketing strategies with different groups of commuters, or rolling out alternative transportation options one at a time to understand the effects of each. Such a data-driven approach will help ensure that programs are appropriately targeted for a given site. The resulting lessons learned should also be publicized to advance the state of knowledge regarding TDM more generally.

- **Expand TDM efforts beyond employee campuses:** Expanding upon BNMC's work, NYSERDA could consider targeting TDM efforts beyond employee campuses. For example, TDM approaches could be used to link multiple campuses in the same region (e.g., linking universities and hospitals). In addition, NYSDOT guidance suggests that elderly, disabled, and low-income populations may be particularly good candidates for TDM because of the systemic mobility challenges those populations face (e.g., inability to drive, lack of vehicle access).[12]

Although the three evaluation questions considered in this case study provided a comprehensive picture of program impacts, NYSERDA could consider tracking additional metrics to evaluate future TDM projects. Data on ridership modes by employee demographics, for example, can provide insight into the effectiveness of various TDM strategies and the engagement of specific audiences. As BNMC noted, collecting these data is both time- and resource-intensive. External research suggests pairing ridership surveys with TDM incentives (e.g., free bus passes) to boost response rates and further encourage behavior change. Conducting occasional surveys can help both by accurately measuring the effectiveness of TDM programs and by providing data that NYSERDA and funding recipients can use to communicate the benefits of TDM to external audiences.

Because surveys are time- and resource-intensive, NYSERDA could require or encourage funding recipients to partner with local transit authorities and ridesharing organizations to track leading indicators of alternative transportation use instead. Although these indicators do not measure overall changes in ridership, and are not limited to the target population, they provide early evidence of shifts in behavior. Examples include:

- Increase in number of NFTA-Metro bus passengers per month (bus ticket sales)
- Increase in number of NFTA-Metro rail riders per month (rail ticket sales)
- Increase in number of people using bikeshare, carshare, and other rideshare platforms per month (registration counts, number of rides taken, miles ridden)

To gain a clear picture of the market uptake of TDM strategies, data for each metric should be collected before and after TDM strategies have been implemented. Data collection should occur over a period of several years to understand the persistence of TDM impacts.

Overall, the lessons learned from implementing TDM at BNMC suggest that NYSERDA can build on and expand TDM in other communities across New York State to achieve transportation efficiency and environmental benefits. To be most effective, NYSERDA should strive to replicate the *process* rather than the individual strategies employed, since TDM strategies by necessity vary according to geographic and demographic factors. In the case of BNMC, data limitations prevent quantitative assessment of

[12] NYSDOT. 2011. New York State Travel Demand Management Program Analysis - Statewide TDM Framework - Key Issues/Potential Solutions. August 2011.

ongoing benefits, but multiple interviews suggested that benefits are likely to grow in the future. Subsequent TDM projects may consider collecting more detailed ridership data to better inform future program strategies.

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