

**Energy Innovation Plan for the Buffalo Niagara Medical Campus
and Surrounding Neighborhoods – Summary**

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Summary

National Grid, the Buffalo Niagara Medical Campus, Inc., its member institutions, the surrounding neighborhoods, and other key stakeholders partnered to develop a five-year Energy Innovation Plan that will support economic development and growth in the greater Buffalo Niagara region. The project represents a new approach to energy innovation that integrates energy efficiency, grid modernization, alternative transportation and renewable energy in the context of a growing medical and life science campus.

The Buffalo Niagara Campus, which is growing at a rapid rate, is becoming the heart of development in downtown Buffalo, New York. Steady growth on the Campus presents unique challenges and opportunities that will encompass capacity requirements, diverse energy delivery specifications, reliability and power quality, overall energy management across buildings and transportation, and other issues.

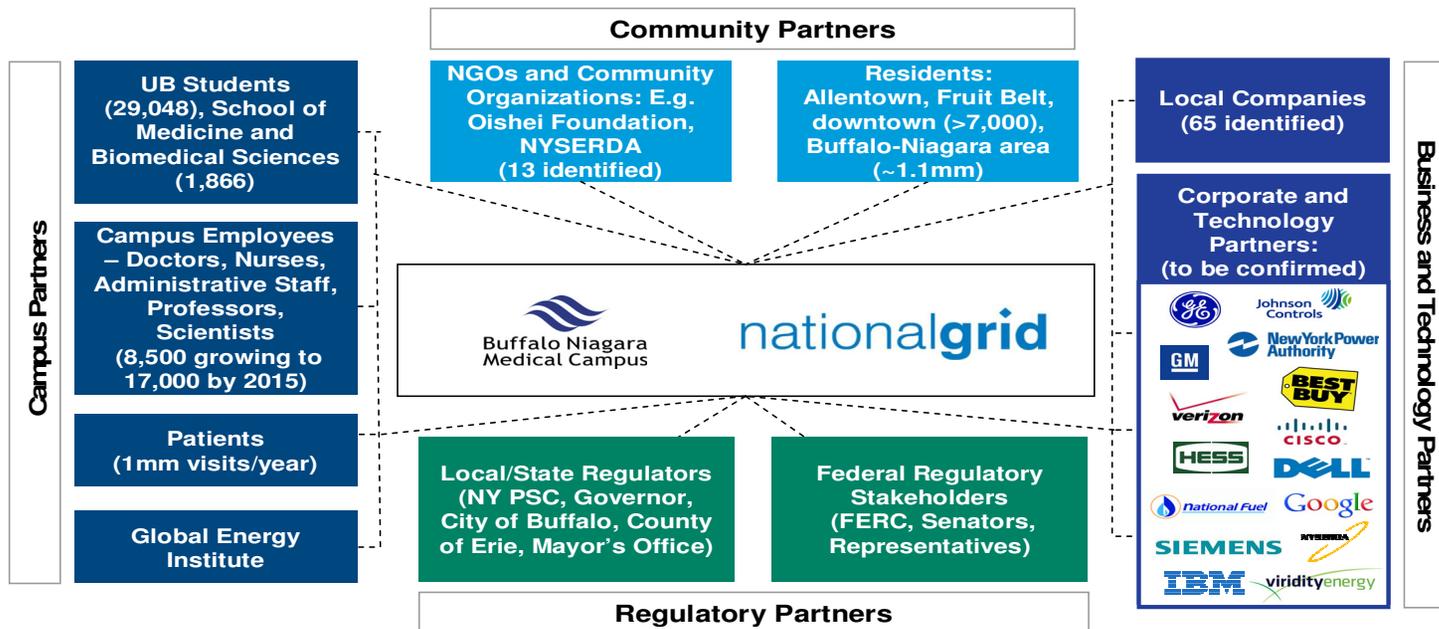
This document describes the Plan, which will be finalized and then implemented under the guidance and direction of the Energy Innovation Council.

Genesis of the Energy Innovation Plan

The Energy Innovation Plan took shape when the campus leadership began talking with leaders in the energy field and realized that as the campus grows, its energy needs, coupled with the need to demonstrate leadership and innovation, grows. The campus needed to think of energy in new ways, including energy efficiency, alternative vehicle infrastructure, renewable energy, and smart technologies to secure the capacity for their expected growth.

How the Energy Innovation Plan Developed

The Energy Innovation Plan began by identifying key stakeholders and partners, including on-campus, such as BNMC institutions; community; regulatory and business. These are mapped below.



Through extensive stakeholder engagement, including one-on-one interviews, listening sessions and workshops, we were able to understand the various needs and priorities of all stakeholders. Based on these sessions and the feedback we received, we were able to identify and develop the Energy Innovation Plan Vision, as well as the supporting pillars, necessary to achieve that vision:

Vision: The National Grid partnership with the Buffalo Niagara Medical Campus will define and implement the global standard for an **efficient, modern, high-quality, and customer-driven energy platform**. National Grid will provide a world class customer experience while enabling BNMC's plans for **economic growth** and innovation both on the campus and in the broader Buffalo-Niagara region.



Building on the vision, feedback from the stakeholder engagement sessions were synthesized into five opportunity areas. Initiatives were then developed and integrated under each opportunity area, with the expectation that they would evolve as the Energy Innovation Plan progressed over time.

Opportunity Areas and Initiatives

In the development of the Energy Innovation Plan, five opportunity areas were identified from stakeholder listening sessions: Cost-cutting Energy Efficiency, Fostering Local Economic Growth, Alternative Energy and Transportation, a Community Learning Hub, Health + Energy Innovation, and Plan Communications. Overall, these initiatives could save the BNMC ~\$2.9-\$12.1 million in annual savings by 2016.ⁱ

Cost-cutting Energy Efficiency

Opportunity to pursue cost-reducing, holistic, innovative approaches to energy efficiency across the campus and in surrounding neighborhoods, while ensuring reliability.

Existing Building Commissioning (EBCx)

Each institution on the BNMC campus is at a different point in the commissioning process for building retrofits.

Considering the type of facilities at the BNMC, BNMC can focus their EBCx efforts on the areas described below:

- Plug loads (including medical equipment, computers, and vending machines);
- HVAC systems (including ductwork, chillers, and boilers);
- Building envelope (including assembly, doors, windows, and insulation);
- Lighting/Electrical systems (including overhead lights and electric distribution); and
- Building control systems (including energy management and automation).

The EBCx process will generate savings in two areas:

- Annual non-energy cost savings, including those from extending equipment life; and
- Annual energy cost savings, including technological and operational changes, particularly in the areas of insulation, lighting, and building controls.

Four Neighborhoods, One Community: Energy Efficiency Overview

This initiative supports and builds on the coordinated planning and development of the BNMC's "Four Neighborhoods, One Community" plan, which is designed to position Buffalo as a national model for how the BNMC as an urban campus and economic development engine can effectively manage energy use to promote economic growth for the greater community.

Community involvement in energy decisions

Stakeholder analysis reveals an increasing demand for energy efficiency programs, many of which already exist. By utilizing community forums with both Allentown and the Fruit Belt, BNMC and National Grid can continue to engage residents, business owners, and community members to provide feedback and discuss the changes they would like to see in their neighborhoods in terms of energy use and economic growth.

Foster Local Economic Growth

Opportunity to modernize current energy infrastructure, providing high-quality, reliable power as the campus grows.

Opportunity to attract new talent and jobs to the campus and surrounding community with an innovative, modern energy platform.

New High Performance Design Construction

Collaboration and sharing best practices for new construction design and commissioning across the BNMC will create shared value and achieve their overall savings target.

In some cases, it will be appropriate to ensure that new construction meets at least LEED silver certification. There are two types of LEED rating guides that may be useful for the BNMC institutions:

- **LEED Guide for Healthcare New Construction and Major Renovations Rating System:** This guide is applicable for inpatient, outpatient and licensed long-term care facilities, medical offices, assisted living facilities and medical education and research centers.ⁱⁱ
- **LEED Guide on Multiple Buildings and On-Campus Building Projects:** This guide is applicable as it covers projects on a shared site under the management of a single entity. This process allows may allow the BNMC to encourage a holistic, sustainable approach to project management, capture economies of scale in the certification process through shared credits, and address the unique challenges and opportunities inherent in campus projects.ⁱⁱⁱ

New Growth Demands

The BNMC is undergoing rapid growth over the next 5-20 years. Figure 1 shows the overall campus build out from the updated BNMC master plan. By mandating that all new buildings on the BNMC campus incorporate higher performance sustainable design and/or meet specific levels of LEED certification, all BNMC institutions can lower future operating costs significantly while also gaining recognition in the market for being leaders in sustainability.

Growth Expectation and Campus Capacity ^v			
	2010 Current size	2015 Near term projects	2030 Academic Health Center
Campus Size (sf)	3.4 million	4.8 million	+/- 10 million
Structured Parking (sf)	861,000 (1,560 + 900 existing cars)	560,000 (1,600 new cars)	1,421,000 (3,200 new cars)
Anticipated Build out (sf)	1.4 million (permitted or under construction)	5.3 million (projected)	TBD

Targeted Campus Grid Modernization

The BNMC grid modernization program can pilot smart technologies to better maximize and integrate other campus investments such as electric vehicles, renewable generation, and institution-owned energy management assets. By building a platform comprised of a) a secure communications network; b) an advanced metering infrastructure; and c) a data management and visualization system, the campus can modernize centuries-old infrastructure while enabling a sophisticated energy savings and innovation platform.

Power Quality and Reliability Enhancement

Interviews with the BNMC institutions suggest that power quality problems or failures jeopardize countless hours and hundreds of thousands of dollars invested in research and patient care, with approximately 12 significant disruptions in power quality each year. Initial calculations suggest that productivity, research, experiment, and clinical service losses cost BNMC institutions ~\$750,000-1.3 million annually.^v

Energy Storage

Energy storage should be considered as a potential technology solution. When integrated with targeted campus grid modernization and distributed generation, energy storage can improve the power quality, reliability, and overall efficiency of the electrical grid

Four Neighborhoods, One Community: Grid Modernization

Grid modernization could provide local businesses and residents with smart meters, home energy management displays, and/or a social online platform to monitor their energy use. The data visualization and management service provider could provide a peer comparison service or other analytics so participants can monitor and make progress.

Alternative Energy & Transportation

Opportunity to position the campus and communities as global leaders in alternative energy and transportation system innovation, enhancing the reputation of the campus, addressing issues of parking and congestion, and creating revenue opportunities.

EV/NGV Fleet and Infrastructure

Buffalo Vehicle Electrification Program Overview

The program seeks to replace the current fleets of the University at Buffalo, Kaleida Health, and Roswell Park Cancer Institute, with plug-in hybrid cars or natural gas vehicles by 2016. The pilot is a targeted investment to incorporate electric vehicles and charging infrastructure into the Buffalo Niagara Medical Campus as a first step to growing the number of electric vehicles on campus and in the City of Buffalo.

The current fleet consists of 3 shuttles, 8 SUVs, and 18 vans on campus. The schedule to replace the vehicles in the current fleet with alternative vehicles (i.e. PHEV or CNG vehicles) is dependent upon need and customer preference.

Vehicle Purchasing Model

Alternative vehicles will be purchased on an as-needed basis. The vehicles will be funded in part by state grants and business partners. The initial upfront investment will come from business partners and BNMC institutions. The payback on these vehicles will range from one to four years.

EV Charging Station

In order to support the projected fleet of alternative vehicles on campus, we estimate that 25 level 3 chargers will be needed on campus. The EV chargers were purchased and installed in late 2011. To date, the BNMC has received funding from the Department of Energy's "Clean Cities" Program, federal tax credits, and AAA (American Automobile Association), who will own and lease several of the chargers on campus.

CNG Charging Stations

In addition to EV chargers, we estimate that a number of CNG refueling stations will need to be purchased. The BNMC is currently applying for NYSERDA (New York State Energy and

Research Development Authority) funding and exploring other funding opportunities, both private and public.

Transportation Demand Management

In addition to fleet conversion, the alternative transportation opportunity within the Energy Innovation Plan involves transportation demand management (TDM) as a means to reduce employee driving and parking rates at the BNMC campus. Reducing driving and parking on campus will allow BNMC to realize financial savings associated with the reduction of parking lot construction and enhance the quality of life on campus by reducing congestion on roads and vehicle emissions.

The BNMC is in the process of implementing a series of transportation improvement initiatives that bring member institutions and community partners together to enhance existing services and infrastructure, create new services for a diverse population, and incentivize people to utilize those services. At the same time, the BNMC and its partners are carefully exploring ways in which to bring all these services and initiatives together into a comprehensive, efficient and convenient transportation system. These initiatives include:

- *The Parking and Transportation Project Management Group (PMG)* to improve access to the campus.
- *Parking Pricing Management* to move away from the current subsidized model and towards a tiered pricing structure that rewards employees for parking farther from campus and freeing up parking spaces for patients and visitors.
- *Campus Shuttle System* to transport employees from more remote parking facilities to their place of employment. The BNMC is also exploring the use of alternative fuel vehicles and stations to promote environmental sustainability.
- *Discounted NFTA Metro Pass* to encourage BNMC employees to utilize the light rail for their daily commute.
- *NFTA Metro Express Bus* from the Southtowns directly to the BNMC without making other downtown stops.
- *Buffalo CarShare* to develop campus-wide car sharing.
- *Bicycle Sharing* to launch a bicycle sharing network throughout the City of Buffalo which will initially focus on the Campus and adjacent neighborhoods.
- *BNMC Community Transportation Program* to facilitate and encourage the use of alternative transportation modes and public transit among BNMC employees and residents of the surrounding neighborhoods.

- *Structured Parking Garage* to be used as an employee parking facility in order to free-up spaces for patients/visitors at more convenient locations near the main entrance of Buffalo General Hospital.
- *Ellicott Street Linear Park* to create a new spine for the Campus that connects BNMC stakeholders with a green and accessible public space.
- *Allen Street Extension* to bring the Allen Street small business corridor through the current Metro Station and into the BNMC.
- *Coatless Connections* (i.e. tunnels and skywalks) to interconnect BNMC facilities starting at the light-rail station.
- *Michigan Avenue and Best Street Improvements* to improve the Michigan Avenue and Best Street corridors, including roadway, streetscape, bike/pedestrian access, traffic calming, operational and infrastructure improvements.
- *Good Going WNY* as an on-line resource for travelers and other ride-seekers to find transportation alternatives.

Community Learning Hub

Opportunity to position the campus and surrounding communities as thought leaders in energy, develop local talent, and become a learning destination.

National Grid Model Energy Home

A first of its kind, the National Grid Model Energy Home is a renovation – and deep energy retrofit - of a turn of the century home within the Buffalo Niagara Medical Campus. The Model Energy Home will serve as a living example of how the character and heritage of such homes can be maintained and celebrated – while making home energy improvements practical and tangible.

Projected to be open to the public in Spring 2013, the Model Energy Home aims to *start the conversation about energy* by:

- Showcasing energy innovations and technologies
- Building the BNMC, the City of Buffalo and the larger region of Western New York's reputation as an energy innovation hub – and “conversation starters” on the issue of energy
- Serving as a source of information on residential energy efficiency programs and incentives offered by National Grid, as well as state and federal agencies
- Promoting learning and research on residential energy use

- Increasing community awareness of energy issues and energy consumption, from energy generation to flipping the switch.
- Engaging the surrounding communities and neighborhoods in achieving energy savings

Global Energy Institute & Smart Energy Control and Diagnostic Center (SECDC)

The GEI is being developed by National Grid and its partners to provide an example for wide-scale, clean energy operations and product replication and to create new opportunities for development, testing, application, and installation. One of the capabilities being developed at the GEI is the Smart Energy Control and Diagnostic Center (SECDC) which will provide centralized monitoring and control of power system operations, including retaining historical data and predicting future system conditions, of the campus to further the Energy Innovation Plan. The GEI will aim to create jobs and new business ventures, and establish partnerships with energy service providers and their suppliers, manufacturers, educational institutions and state and government agencies.

Academic Partnerships

To facilitate the training of the next generation energy workforce, and contribute to the research, development, and deployment of new energy innovations, it is important to integrate existing educational programs and provide additional funding and support to secondary schools and schools of higher education. The Global Energy Institute can collaborate with workforce development programs such as National Grid's Engineering Our Future to share "lessons learned". In addition, the internationally known Power Center for Utility Explorations has moved to the University at Buffalo (UB PCUE).

Health + Energy Innovation

Opportunity to pioneer new research, technologies and collaboration at the nexus of health and energy to retain and recruit top talent in the region.

Through academic and public-private partnerships, there is the opportunity to develop energy innovations that are tailored to meet the specific needs of the health sector. Building on Buffalo's legacy of energy innovation and leveraging the region's growing health care innovation, the Health + Energy sector may present a variety of opportunities for development.

Plan Communications

Due to the holistic, comprehensive, multi-stakeholder, and complex characteristics of the Energy Innovation Plan, the BNMC and National Grid will have coordinated communications of the Plan along with partnerships goals, initiatives, projects and progress.

Outreach and Education

The Energy Innovation Plan was created through an ongoing, wide-reaching stakeholder approach to define value for the BNMC institutions, community members, and regulatory stakeholders. The BNMC and National Grid will continue to assist each other to support institution, business partner, vendor, regulatory and community engagement.

ⁱ GreenOrder Analysis 2011.

ⁱⁱ LEED Application Guide for Multiple Buildings and On-Campus Building Projects, <https://www.usgbc.org/ShowFile.aspx?DocumentID=7987>, 2010

ⁱⁱⁱ LEED Application Guide for Multiple Buildings and On-Campus Building Projects, <https://www.usgbc.org/ShowFile.aspx?DocumentID=7987>, 2010

^{iv} BNMC Master Plan Update, 2010

^v GreenOrder Analysis, 2011