

West Monroe Responses to Partnership for New York City Follow-up Requests June 5, 2020

1. **Bullets on any additional complications or benefits in taking a regional (vs. city-specific) lens to energy initiatives**
 - The benefits or complications from taking a regional versus City-specific approach to energy initiatives and investment is best determined on a project-by-project basis, and benefits and complications will differ in magnitude and scale depending on the project and political will of decision makers.
 - The benefits of a regional approach to energy initiatives, particularly for capital intensive projects like offshore wind, battery storage, transmission and distribution system upgrades (T&D), and electric vehicle charging infrastructure ensures that projects are coordinated and developed with regional benefits in mind. For example,
 - Regional cooperation in siting and building offshore wind projects off the NY, CT, and NJ coasts and in delivering wind power to customers can create economies of scale, lowering project development costs and lowering electricity prices. [See page 5 for additional materials for inclusion consideration regarding upgrading seaport infrastructure to support the offshore wind industry]
 - Battery storage can be more strategically located in areas where power flows are now constrained, leading to lower development and electricity costs when taking a regional approach.
 - A regional approach to T&D system upgrades can ensure load centers have more points of interconnection to the electric grid and natural gas pipelines, thereby minimizing delivery constraints, leading to more competitive prices and lower costs.
 - Vehicle charging stations can be located along the most heavily traveled commuting and freight routes throughout the tri-state region under a regional approach.
 - Complications in taking a regional approach to energy initiatives can take the form of:
 - Longer lead times and delays in planning, funding, and building energy projects due to the need for consensus.
 - Disproportionate investment and job creation among regions depending on where energy projects are sited, and potential environmental justice concerns for disadvantaged communities hosting energy projects.

- Potential inequity in realization of benefits among regions and affected populations.

2. Bullets on why a centralized energy grid cannot work for renewable energy initiatives and "what it would take" to realize the transition to a decentralized grid.

- The graphic depicted in West Monroe (WM) May 15, draft write-up representing a more diversified and distributed electric grid is not intended to convey a replacement but rather deployment of different types of assets, distributed locations on the grid, and different operational characteristics of the grid with two-way communications and power flows, compared to today's grid. It depicts how assets and a shift in consumer behavior operating in grid-light, grid-assisted, or potentially off-grid environment leading to lower net energy environment impact with increasing reliance on distributed generation and energy storage.
- For maintaining or improving grid reliability and resiliency, a transition to a more distributed grid would still require limited and strategically located central station and peaking power plants to maintain voltage and for quick ramping capability to speed power restoration following unplanned outages (e.g., severe weather events).
 - For example, centrally located nuclear power plants and large-scale hydroelectric generating facilities which currently operate near-continuously, would be expected to continue to do so and natural gas-fired peaking generation will still be required to follow-load (meeting peak demands) until replaced by battery storage.
- The electricity industry nationally and in particular in New York, New Jersey, and Connecticut is transitioning to a more distributed grid, due to improved economics of smaller distributed energy resources located closer to load centers and the improved environmental performance of these resources (reduced or no greenhouse gas emissions) in support of the tri-state GHG reduction goals.
 - For example, NY State's Nation leading clean energy and climate goals are to achieve 70% renewable electricity generation by 2030, 100% of clean electricity by 2040 and 85% reduction in GHG by 2050.
- Much of the statewide investment data included WM's May 15, draft report is directed at supporting the transition to a more distributed grid and greater electrification of buildings and transportation to achieve the State's clean energy and climate goals.
- The two grid configurations (centralized v. distributed) can and will co-exist with the transition tipping more toward decentralized and distributed energy resources, leading to cleaner and more affordable energy options for consumers.

3. Follow up with Centers of Excellence on opportunities to expand/focus on commercialization of innovations coming out of the region's universities (from Paul's comments during Friday's session)

Note: Information and data provided were obtained from Empire State Development Corporation Annual Reports; ESD budget testimony and legislative briefings; 2020 State Budget Appropriations; and discussions with Center for Advanced Technology personnel.

- Empire State Development Corporation (ESD) of New York State, funds research and development and facilitates commercialization of technologies and innovations in partnership with businesses and industry. ESD's Division of Science, Technology, and Innovation (NYSTAR) supports the State's 13 Centers of Excellence (COEs) and 15 Centers for Advanced Technology (CATs) at colleges and universities in New York.
 - The 15 CATs received over \$14 million in 2019, from the State enabling upwards of \$42 to \$706 million to be invested in university COEs. State funding in 2020 is less at \$12.3 million, enabling \$40 to \$61 million invested in university CATs. [CATs leverage New York's research expertise and funding with investments from the federal government, foundations, businesses, venture capital firms and other entities with 2 to 1 funding ratio - private match to public funding. Federal funding match is four to one]
- Any new federal stimulus or infrastructure funding should appropriate a portion of funds to NYC CATs to leverage private capital to spur technology innovations and commercialization, create local jobs in and around the CATs.
- Every dollar of State funding is required to leverage two dollars of private sector capital and or four dollars of federal matching funds. Statewide COEs and CATs combined, over the 2017 to 2019 period generated:
 - 9,816 jobs (either created or retained)
 - Over \$2.6 billion in economic impact
 - A return of 30:1 for each dollar invested
- According to the State Comptroller, New York State has the 3rd largest high-tech sector in the nation.
- NYSTAR funds 13 Centers of Excellence (COE) to foster collaboration between the academic research community and businesses to develop and commercialize new products and technologies, and to create and expand technology-related businesses and employment in New York.

- The COE in Precision Medicine and Responses to Bioterrorism and Disasters at New York Medical College, and the COE in Digital Game Development at New York University, in a networked partnership with COE's at Rensselaer Polytechnic Institute and Rochester Institute of Technology.
 - New York Medical College's COE combines its globally recognized assets in disaster medicine and medical countermeasures with strategies to defend against biological and chemical threats.
 - The Digital Game Development COE at New York University is dedicated to the exploration of games as a cultural form and game design as creative practice, recognizing that games are experiences that entertain, explore complex topics, communicate ideas, and illuminate truths about the world around us.
 - Since 2014, more than 100 students have graduated from NYU with degrees in game design. Two-thirds of those graduates have stayed in New York State to work, most in games-related industries, such as game studios, small tech start-ups, academia, museums, media agencies, and as freelancers.
- The 13 COEs received over \$16 million in 2019, from the State enabling upwards of \$32 to \$64 million to be invested in university COEs. State funding in 2020 is less at \$10.6 million, enabling \$21 to \$44 million invested in university COEs.
- Any new federal stimulus or infrastructure funding should appropriate a portion of funds to NYC COEs to leverage private capital to spur technology innovations and commercialization, create local jobs in and around the COEs.
- NYSTAR funds 15 Centers for Advanced Technology (CATs) to foster collaboration between industry and universities in developing and commercializing new technologies and includes CATs at New York University Polytechnic School of Engineering, and City University of New York.
 - The Center for Advanced Technology in Telecommunications and Distributed Information Systems (CATT) at New York University Polytechnic School of Engineering partners with providers and users of telecommunications and information systems to turn the latest developments in these technologies into competitive and productive resources.

- In 2017-2018, CATT’s research helped create 173 new jobs in the state and had a non-job economic impact of over \$187.8 million to New York.
- The City University of New York Center for Advanced Technologies in Sensors for Exploration of Natural Systems and Environments is developing next-generation sensor systems and applications, expected to help the state accelerate its leadership role in research and business in global sensor technology.

**Additional Material for Report Inclusion/Consideration:
Offshore Wind Sea Port Staging Area**

- New York’s clean energy goals include the development of 9,000 MW of offshore wind energy operable by 2035 – supported by \$200 million in state funding to upgrade New York’s port infrastructure. The port upgrade is projected to create more than 1,600 jobs and result in \$3.2 billion in economic activity.¹
 - Enhanced port infrastructure is required to support offshore wind supply chain and facilitate connection of onshore manufacturing and manage pre-assembly activities for offshore projects. The delivery of wind energy components is expected later in 2020 through 2024 highlighting the need to initiate Port Infrastructure upgrades as soon as possible during Reinvention phase.
- The existing South Brooklyn Marine Terminal, Upper Bay Terminal, Arthur Kill Terminal (Staten Island), and Newark Bay Terminal offer established port infrastructure and functionality that can be configured to serve as renewable energy hubs and provide long-term economic benefits to tri-state region.
 - These ports are within accessible proximity to recently awarded contracts/leases for Empire Wind and Sunrise Wind Projects which total over 1,600 MW of capacity.
- These terminals require significant configuration and development to support offshore wind power generation. Transmission and interconnection equipment as well as specific infrastructure requirements for selected OSW terminals should consider the time and costs of such configuration at the onset, developing each in stages.²

¹ NYSERDA, “New York State Launches Process to Upgrade Port Infrastructure to Support Expanding Offshore Wind Industry” (October 2, 2019).

² Brattle Group, “Impacts and Implications of Covid-19 for the Energy Industry” (May 12, 2020).