Microgrid Financing Options to Facilitate Future Growth  
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Michael J. Zimmer, executive in residence and senior fellow at Ohio University, was recently an invited speaker at The 4th Microgrid Global Innovation Forum held May 16-17, 2017 at George Washington University in Washington, D.C. Mr. Zimmer addressed issues and innovations on evolving microgrid financing options primarily in the U.S. With other experts on his panel, “Evolving Microgrid Financing Options,” he contributed to the deeper understanding of structures to secure microgrid financing and the changing infrastructure and policies affecting microgrids. Mr. Zimmer also serves as Washington Counsel for the Microgrid Institute since its founding in 2012, and advises its newly-created Microgrid Finance Group formed in 2016. Mr. Zimmer has guest lectured on microgrids in various classes at Ohio University, in local meetings sponsored by Upgrade Ohio, and in various national fora. Below, Mr. Zimmer draws from and builds upon his recent forum remarks last month.

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Microgrids represent one of the fastest-growing technologies in the electric utility industry today offering multiple benefits to the state, the utilities and the customers they serve. North America hosts the largest deployment of microgrids, closely followed by Asia and Europe. The key growth driver for the future will be in the commercial and industrial arenas that will grow to represent 30% of global markets. Commercial and industrial projects are primarily driven by cost and economic benefits of solar, combined heat power, energy storage and their interface especially for hospitals, data centers, military, universities, schools and healthcare facilities. Ohio has just started to examine these questions as part of it grid modernization proceedings launched in April 2017 by the Public Utilities Commission of Ohio (PUCO).

Noting that soft costs are 50% of the development costs for microgrids, there is an increasing quest to standardize the microgrid as service model including use of more sophisticated control systems, DC power flows, better storage technologies, and closer integration with advanced metering. For many decades, the transmission and distribution (T&D) sectors were solely served by the electric utilities. Now the question is arising as to who will modernize the T&D sectors in the future? Many stakeholders, including energy service companies, equipment vendors, the five major technology and information management companies, foreign vendors and international utilities, startups, entrepreneurial companies and telecom companies, along with the electric utilities, are seeking to serve this $400 billion per year electricity sales and services market in the U.S. Electric power is one of the most capital intensive sectors in the national economy today scheduled to spend up to $2 trillion by 2030 to modernize the aging U.S. electric system.

The microgrid derives its value from its interwoven complexity. This is exactly what makes quantifying its value so difficult and also makes the issues of capital access and financing more challenging. Government funding typically covers only a portion of the microgrid’s costs. For the remainder, microgrids tend to rely on variations of financing models that originated in other related industries. These include such tools as direct ownership, utility rate base treatment, vendor financing, energy service contracts, power purchase agreements, leasing, debt and bond financing, green and
infrastructure banks and other clean tech energy model and tools in the state marketplace. As microgrids move from the pilot or demonstration phase to fuller commercial deployment, the quest arises for more financial models and disciplined structures to support financing ahead. Right now in the United States, that there are five major viable financing models:

1. Special microgrid investment funds;
2. Vendor financing;
3. Energy service companies;
4. Utility financing (in rate base or through unregulated special entities); and,
5. Warehouse financing.

The best way to analyze microgrid financing is from the vantage point of risk management strategies. Key areas of opportunity to differentiate and create success for microgrid project financing include:

- A capacity maintenance agreement with regular service for the project;
- A minimum amount of capacity guaranteed from the microgrid system to ensure a minimum bill or baseline to support project financing;
- A solid warranty from an investment-grade vendor ideally for 1-3 years;
- An insurance policy covering certain extraordinary costs, performance and/or the efficacy of the system designed for the microgrid;
- A battery disposal strategy of e-wastes associated with decommissioning batteries from the project as energy storage increasingly is part of a project; and,
- Aggregation to create scale, diversify risk and support a more attractive regulatory outcome to diminish regulatory risks for the project.

Diving deeper into warehouse financing and performance—a form of integrated development finance for portfolios of sound, developed microgrid projects—is important for flexible financing at commercially-reasonable terms and interest rates to support project development and success. Warehouse financing should be coupled with smart incentives such as clean funding mechanisms (in the 21 states that offer that special funding), green banks or under the Smart Cities movement in the United States. Finally, technical assistance with small grants for technical services and predevelopment costs are desirable to support the warehouse financing strategy.

Warehouse financing builds a project pipeline that can access the capital markets more efficiently through securitization. Short-term development and aggregation of loans occurs that facilitate secondary market participation and lower the capital costs for projects. This financing could also be coupled with credit enhancement techniques to reduce risks and round out the capital stack for a microgrid project coming from foundation program-related investments (PRI's), donor management funds or clean technology funds at the state level. These credit enhancements could take the form of guarantees, subordinated debt, loan loss and debt service reserves, or interest rate buy downs to diminish risks and attract private capital and lending.

Warehouse financing is already being used in the U.S. for energy efficiency, PACE loans, solar project development and also recently energy storage loans. Such loans often range from 10-20 years and carry interest rates of 5-6%, plus closing costs. The state repackages smaller loans to reach a certain value of closed loans at certain aggregated levels to create scale. These packaged loans are then securitized through the secondary capital markets and the loans are leveraged with ratios ranging from 4-8 times the original values reported by various sources in Connecticut and New York. Pennsylvania also participates in its energy financing strategy in a multistate warehouse for energy efficiency loans called...
“Warehouse for Energy Efficiency Loans,” or “WHEEL.” This program is administered by AFC First Financial and is used by states seeking access for clean energy lending and financing. WHEEL works through the National Association of State Energy Officials (NASEO), the Pennsylvania Treasury, Renewable Funding, and Citigroup Global Markets, to package these smaller loans that are sold to bond investors. Proceeds from sales after aggregated and bonds are issued, go to recapitalize original state funds. Strict lending criteria are followed and high minimum credit scores are sought for risk management. Contractors are trained in intake and origination to ensure quality control over such programs.

For microgrids to succeed in their financing goals, their financing strategies must be built from known successes, existing capital market frameworks and often states with Green Bank or Resiliency lending programs. Success in financing balances:

- Leveraging existing contractor networks;
- Consulting with the financial community for project development;
- Identifying sustainable funding sources with long-term viability; and,
- Engaging utility partners, ensuring knowledge of available rebates and including on-bill financing mechanisms with state utilities.

When thoughtfully conducted, less taxpayer or ratepayer dollars are utilized and these programs facilitate use of public-private partnerships—“P3” structures and mechanisms in the 36 states with P3 framework legislation.

Financing support must be demanded by vendors, project developers and microgrid leaders. The industry itself will not just happen as a matter of state policy or through utilities without a market-based demand from its customer base.

Related research from a National Institute of Building Sciences (NIBS) task force augments this discussion by looking at resiliency-based mortgage financing for residential and commercial/industrial applications. Resiliency suffers from a lack of commonly-defined terms, similar to the lack of standardization in defining a microgrid, and even P3s. For a microgrid project financed with resiliency considerations in the cash flow and income aspects, determinations will still need to be made about the quantity, additionality and nature of ancillary benefits from the project. These must be guided by the industry and will be based also upon state public service commission determinations. To secure resiliency benefits and additional cash flow, the microgrid must offer:

- A determination of hazard/risk expressed in probabilistic terms over underwriting scenarios over one or more time periods;
- Resilience offered by the microgrid, measured against a potential disaster event based on the level of risk and potential added improvement in resilience associated with the microgrid investment;
- Evaluation of the dollar amount of losses avoided based on the microgrid project’s resilience to a calculated hazard risk should be developed by the sponsor over the life of the loan and also on an annualized basis;
- Value and/or net operating income should be reevaluated based on avoided losses created by enhanced resilience from the microgrid; and,
- Negotiation of loan terms to reflect additional value from building the microgrid and the income streams associated with the project. The lead in both isolation of those streams and calculation methodology should come from the developers and the industry itself working closely with its
vendors. Additional revenue streams would facilitate consideration of larger project loans, the inclusion of development phase, down payment reductions for private lenders or interest rate reductions in return.

Despite differences across international and domestic U.S. markets, access to market-based financing will facilitate the rapid growth of the microgrid industry in the coming decade. Some in the electric industry see microgrids as the next market iteration of solar, which has grown 800% in the period from 2010-2015. Solar expanded another 119% in 2016 alone. Financing is the primary growth factor and will serve as an essential catalyst for future growth of microgrids with energy storage.

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