BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Commission's Review of Time-Differentiated and Dynamic Pricing Options for Retail Electric Services	))))	**Case No. 12-150-EL-COI**

COMMENTS
BY THE
OHIO BUSINESS COUNCIL FOR A CLEAN ECONOMY

I. Introduction

The Ohio Business Council for a Clean Economy ("OBCCE" or "Business Council") now respectfully submits comments in this proceeding. The Public Utilities Commission of Ohio ("PUCO" or "Commission") initiated this proceeding to solicit comments from interested parties regarding issues surrounding dynamic pricing and other options for generation customers. The OBCCE, through its comments, seeks to provide clarity on certain issues presented in the Commission's Entry dated January 11, 2012. The Business Council, as an interested party, appreciates the opportunity to assist the Commission in its goal of "assur[ing] that the pricing options available to consumers for competitive retail electric service are consistent with state policy."[1]

This case may significantly affect in-state investment in the technology and equipment associated with time-differentiated and dynamic pricing options. These and other issues, which

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[1] Commission Entry at 1 (January 11, 2012).

are a part of this proceeding, may directly impact the OBCCE's interests in positioning Ohio as a world-leader in the development and manufacturing of clean energy and associated technologies, and the interests of Business Council members engaged in these industries. As such, OBCCE now respectfully submits these comments to the PUCO, using the Entry as an outline.

II. In Order for Time-Differentiated and Dynamic Pricing to Enhance System Resilience and Reliability, Related Issues such as Storage Capacity Must be Addressed.

The Commission has stated one of the goals in this docket as: "By encouraging the development of time-differentiated and dynamic pricing options, the Commission is seeking to provide consumers with additional tools to manage their electricity bills, improve utility asset utilization, and enhance the reliability and resilience of the power system."[2] In order to do so effectively, other components related to ensuring the successful implementation of dynamic pricing options must be considered.

Energy Storage Devices

Some energy storage devices such as the Beckett DESS allow for optimal grid performance and reliability which can maximize the value of time differentiated and dynamic pricing and support our national policy for energy independence and the stated goal here of power system reliability enhancement.[3] In addition, it is recommended that dynamic pricing ensure a meaningful differential between peak and off-peak pricing and to keep these price

[2] Commission Entry at 1-2 (January 11, 2012).
[3] Id. At 2.

differentials in place in the market for at least 10-15 years due to the capital-intensive nature of such equipment.[4]

1. Energy storage provides a vehicle for compliance with FERC Order 137.

FERC Order 137, issued in October 2011, states that RTOs and ISOs fairly compensate frequency regulation resources based on the actual service provided. Energy storage devices act as fast-ramping resources to meet frequency regulation needs that accurately follow the dispatch signal.[5] Therefore, the integration of this technology, concurrent with dynamic and time-differentiated pricing, will be important as a foundational element for the successful implementation and maintenance of such a plan. It is important for the Commission to address these issues in a "big-picture" way to the extent possible. Looking at how energy storage technology would enhance the subject pricing options should be a part of the ensuing discussion here.

2. Energy storage provides value to Customers.

Appropriate rate design will encourage the intelligent integration of distributed generation with energy storage to deliver predictable and optimal resulting load shapes. This will prepare the grid for demand changing future loads such as electric vehicles. Commercial and Industrial customers can further utilize energy storage devices to reduce their cost of electricity through load shifting and peak demand monitoring.

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[4] See Attachment A: *Application of Southern California Edison Company to Establish Marginal Costs, Allocate Revenues, Design Rates, and Implement Additional Dynamic Pricing Rates*, Califonial Case No. 11-06-07, Response of the California Energy Storage Alliance at 3 (July 8, 2011).

[5] *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, Federal Energy Regulatory Commission, Docket Nos. RM11-7-000 and AD10-11-000; Order No. 755; Order 137 at ¶35 (October 20, 2011).

3. Energy storage provides value to Utilities.

Energy storage also provides several benefits to utilities, including:

- Energy storage allows utilities to deploy their assets in an optimum manner to achieve peak shaving and load shifting goals. Additionally, with this flexible capacity, Utilities can defer or eliminate capital spending required for generation, transmission or distribution projects that energy storage provides.
- Energy storage increases reliability of the grid through voltage, frequency and power factor correction.
- And finally, energy storage in a dynamic pricing environment provides utilities price arbitrage opportunities.

Thus, dynamic and time-differentiated pricing and energy storage will, together, provide benefit to customers and utilities, and enhance the reliability and resilience of the grid.

4. Energy Storage will create Ohio jobs.

Energy storage strengthens Ohio's position as a world leader in the development and manufacturing of clean energy and associated technologies. In Northeast Ohio, the continued research, development and manufacture of storage batteries currently provide 640 jobs and expected job growth up in these areas will reach 2350 jobs by 2018.[6] Therefore, along with the development of dynamic pricing options and education, the maintenance, promotion and expansion of related industries should also be considered and encouraged to increase Ohio's share of the advanced and clean energy jobs.

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[6] See Attachment B, *Northeast Ohio Advanced Energy Portfolio: Energy Storage*, for additional information on energy storage job and technology development.

Coupled with the current and expected growth of jobs in the Smart Grid area, a merger of energy storage and the current smart grid industry could lead to significant job growth. Currently, the smart grid and related industries account for 220 jobs in the Northeast Ohio area.[7] The expected growth in this area may be up to 1040 jobs by 2018. Ohio should position itself to capture as much of this economic activity as possible. Coupling the energy storage component with dynamic and time-differentiated pricing to ensure a successful pilot is likely to lead to the expansion of smart grid technology in the future. This expansion and robust growth of both industries will benefit all Ohioans and accomplish the Commission's stated goal of improving utility asset utilization and enhancing the reliability and resilience of the power system.

III. Retail Pricing Options Should be Offered to Customers with Advanced and Interval Meters and the Best Way to Provide These Options to Customers is a series of Workshops.(¶¶ 1& 2)

A. Real-time or dynamic pricing options should be offered to all consumers with advanced or interval meters.

Existing customers with advanced or interval meters should be empowered to utilize this technology in the pursuit of low cost electricity. Dynamic and time-differentiated pricing allow customers to employ this equipment and respond quickly to changing prices. A successful deployment will create smarter consumers who are better informed as to their usage and of the cost of electricity at the time of consumption.

B. Possible Options should be presented through a series of workshops.

Customers ready to employ existing advanced and smart meter technology will likely attend workshops held in the communities in which this technology exists. Potential financial

[7] See Attachment C. *Northeast Ohio Advanced Energy Portfolio: Smart Grid*, for additional information on smart grid job and technology development.

benefits should provide a strong motivation, especially given current economic conditions. Voluntary participation in workshops will likely result in a higher percentage of customers that may actually attempt to utilize the technology for their own benefit. The Business Counsel encourages the Commission to develop, explore and implement these workshops.

IV. OBCCE supports an on-line comparison calculator provided that it is versatile enough to allow customers to enter different consumption pattern data. (¶¶3,4 &5)

An on-line calculator is almost essential. It would provide education, information and guidance at the customer's convenience. Data, however, is scarce to drive such a calculator. The calculator would need to allow the user to "change" their consumption pattern to see how different behavior would result in lower fees with different rates (i.e., run their washer and dryer at night instead of during the day). Or, it would need to run a parametric simulation and offer to the consumer different consumption patterns under different rates with the optimal overall fee.

EDUs and CRES providers should propose educational plans. A calculator with the ability to alter consumption patterns would be an important key to developing the most effective educational plan as this would allow customers to understand the effects on their bills through specific consumption pattern changes.

V. OBCCE Supports EDUs offering Time-differentiated and Dynamic Rates and Addresses each related issue separately below: (¶6)

A. EDU Time-Differentiated and Dynamic Retail Rate Options to Customers:

The Business Council supports EDUs offering customers time-differentiated and dynamic pricing. The OBCCE also supports the inclusion of an option that reflects PJM prices. First, these programs and tariffs will reflect the dynamic prices in the PJM interconnection market. This will affect residential and commercial customer behavior in ways that will benefit

the customer and the electric grid. The effect will likely reduce the peak demand, as customers will respond to lower rates by increasing usage at off-peak times in order to save money.

Second, this will benefit the EDUs because of a load-shift to off-peak hours. This will allow the EDUs to purchase less power during peak time and avoid higher PJM interconnection market prices. This effectively reduces utilities' costs to serve customers.

B. Two-part Dynamic Pricing with a Hedging or "Insurance" Component:

EDUs should also be encouraged to offer a dynamic price signal that contains a hedging or insurance component addressing customer risk-aversion. The Business Council supports this option because it is a recommended component of any dynamic pricing offering.[8] This allows customer to opt-out during critical peak times when they are informed of the rate shift. In essence, this assists customers in changing behavior while at the same time shielding them from unexpected events such as weather extremes.

C. The OBCCE Encourages Time-of-Use Hourly Rates as One Specific Form of Dynamic or Time-Differentiated Pricing Option.

Time-of-use hourly rates should be considered as an option offered to customers. These are price rates with hourly boundaries. Typically, the highest rate tier occurs when peak demand is greatest. Peak demand rate prices vary based on the coincident peak demand with the peak

[8] See, for example: Hurst, Eric; *THE FINANCIAL AND PHYSICAL INSURANCE BENEFITS OF PRICE-RESPONSIVE DEMAND* at 10 (January 2002). http://www.hks.harvard.edu/hepg/Papers/Hirst%201-02%20ins%20benefits%20price%20responsive%20demand.pdf

pricing period of PJM interconnection pricing. Customers who choose to participate in such rates could experience significant savings.[9]

D. The Business Council Supports Field Testing for Rates.

Field Testing of rates may be crucial as these options are introduced. Even though there have been field trials, this is a new market and there will be a learning curve for many customers. Field tests are crucial to obtain customer feedback and analyze, understand and employ additional information customers may require from EDUin order to maximize benefits from the new rates.

E. While no Specific "Barriers" Exist to Offer Dynamic Pricing to Customers Already Possessing Advanced or Interval Meters, Some Implementation Challenges May Need to be Addressed:

While no substantial barriers exist to offer dynamic pricing to customers, there are some implementation challenges that should be addressed. Customers already in possession of these meters are familiar with how they work and hopefully have the ability to utilize them. But some of the challenges that need to be addressed are:

- Ensuring real time access to meters by customers or CRES providers;
- Ability to communicate and respond via home energy networks (via IP infrastructure);
- Providing CRES providers reliable, open access to wholesale pricing signals from PJM.

Some of the solutions to the above may need to be developed and perfected with significant input by the EDUs and CRES providers, with assistance from the Commission and interested parties.

Potential solutions that can be employed to support implementation:

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[9] Jongejan, Arie, et al: *Dynamic Pricing Tariffs for DTE's Residential Electricity Customers*, University of Michigan at page 13 (April 2010). http://css.snre.umich.edu/css_doc/CSS10-04.pdf

- Utilize PUCO regulatory authority to deploy energy management systems to residential consumers;

- Seek sources of energy efficiency funding (Department of Energy; Ohio Third Frontier; etc.) to deploy energy management systems to residential consumers.

These and other options should be considered in order to provide dynamic and time-differentiated pricing options to customers.

F. EDU and CRES Provider Education of Customers is an Important Part of any Time-Differentiated and Dynamic-Pricing Option.

Customer understanding of different Pricing Options will be an important part of any successful implementation. The following topics should be reinforced as part of the residential consumer education process:

- Consumers can benefit by conserving energy and shifting usage to off-peak periods (going green/sustainability);

- Consumers can benefit by saving money in exchange for participation in the program;

- Consumers can benefit by having systems to support home automation;

- Empowering consumers to control their energy bills.

Consumers have been accustomed to a flat rate for many years. Dynamic Pricing will be a significant change that requires adequate information presented in an accessible manner. The plans should address:

- Scenarios where consumers may be charged a higher rate;

- How to minimize or avoid the high rate scenario (i.e.- customers would pay the lower of the flat rate bill and the dynamic pricing bill in the first year. The bill protection would then be phased out over a three to five year period.

In general, the Commission and interested parties may need to undertake a significant effort,

prior to the utilization and deployment of pricing options, to ensure that the complexity of such options are minimized to the greatest extent possible before involving customers. A successful design effort will in turn render the customer education portion of time-differentiated and dynamic pricing options much easier.

VI. Price-to-Compare information should be developed in a way that is relevant and useful to customers, and a secure on-line application should be developed. (¶¶7 &8)

A. The Development of an on-line application is Reasonable and Practicable:

Bill Comparisons will be an important source of customer understanding of the benefits of time-differentiated and dynamic pricing. Technologies exist today that allow consumers access to a vast array of private data, including banking, savings, retirement accounts. Customers are already familiar and comfortable with these technologies. These same sources of technology may be sued to provide data to customers to compare utility usage and billing information. The PUCO should encourage the use of this technology to bring about a comprehensive and complete deployment of dynamic pricing options.

B. Comparable Applications are Already Commercially Available:

The Business Council encourages the use and incorporation of available products by existing vendors. These vendors include *Aclara*, *Efficiency 2.0* and *Opower*.

C. Specific Elements to Assist in Providing Greater Benefit to Customers:

There are specific elements to employ in conjunction with the applications mentioned above. These include access to utility smart meter or advanced meter data in as close to real time as possible. In addition, data should be published in a standards-based protocol (i.e. *OpenADE*

"Green Button") in order to facilitate innovation in the development of analytic software to help consumers understand the data more effectively

D. Alternative Approaches to be Considered by the Commission: Providing a Similar Option for Manufacturing and Industrial Customers.

In Ohio, manufacturers and industrial customers make up the majority of the State's energy consumption. Making such an option available to these customers, now or in the near future, should be considered where not currently applicable. Leveraging dynamic and real time pricing as well as demand response can create a competitive advantage for manufacturing in the state, recovered through reduced COGS (Cost of goods sold) and leveraging incentives as a catalyst for investment. In order to flatten demand profiles, reduce baselines, automate demand response, and provide load shifting, manufacturing customers will invest in systems that provide an ROI (return on investment) that will pay dividends over the lifecycle of their product development. Some of the technologies and methodologies that will be deployed to support this development may include:

1. Energy monitoring and management solutions
2. Power factor correction
3. Variable Frequency Drives
4. Process optimization and Model Predictive Controls
5. Utility management solutions
6. Demand response and automated demand response
7. CoGeneration
8. Energy Storage and Retrieval systems
9. Alternative and advanced energy generation

10. Compressed Air optimization

11. Mechatronics and optimized mechanical and electrical design.

12. Heat recovery and CHP (Combined Heat and Power)

These types of developments will lead to sustainable production facilities that maintain and create jobs in the state. Many of these solutions are available from manufacturing partners within the state. Further development of these technologies is better cost justified in the industrial space and technologies developed here will find their way into the commercial and residential markets as the commercialization matures. Therefore, this expansion of options should be considered. Ohio can lead in the advanced and clean energy business and manufacturing areas, and bold additions to the options for larger customers will benefit all customers by making the adoption of such options and its accompanying technology routine, and drive down the cost of the equipment needed for deployment.

VII. Conclusion

For the foregoing reasons, the Ohio Business Council for a Clean Economy respectfully requests that that the Commission consider and adopt the Business Council's recommendations as submitted. Business Council Members look forward to participating in future activities related to this proceeding and sponsored by PUCO.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that a true and accurate copy of the foregoing *Comments by the Ohio Business Council for a Clean Economy* has been filed electronically with the Public Utilities Commission of Ohio and has been served upon the following parties via electronic mail on April 11, 2012.

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Attachment A

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Southern California Edison Company To Establish Marginal Costs, Allocate Revenues, Design Rates, and Implement Additional Dynamic Pricing Rates	Application 11-06-007 (Filed June 6, 2011)

RESPONSE OF THE CALIFORNIA ENERGY STORAGE ALLIANCE

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July 8, 2011

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Southern California Edison Company To Establish Marginal Costs, Allocate Revenues, Design Rates, and Implement Additional Dynamic Pricing Rates	Application 11-06-007 (Filed June 6, 2011)

RESPONSE OF THE CALIFORNIA ENERGY STORAGE ALLIANCE

In accordance with Rule 2.6 of the Rules of Practice and Procedure of the Public Utilities Commission of the State of California ("Commission"), the California Energy Storage Alliance ("CESA")[1] hereby files this Response to Southern California Edison's ("SCE's") application to establish marginal costs, allocate revenues, and design rates for service provided to its customers ("Application"). SCE's Application is related to SCE's Application (A.)10-11-015, SCE's request to increase its Commission-authorized revenues for service in 2012 and which is commonly referred to as "Phase 1 of SCE's 2012 General Rate Case."

I. INTRODUCTION.

CESA is an *ad-hoc* advocacy group made up of energy storage and renewable energy system integrators, consultants and energy storage system manufacturers. CESA's mission is to expand the role of energy storage to promote faster adoption of renewable energy and a more stable and secure electricity grid in California. CESA does not protest or comment on the merits of the authority sought in the Application. Rather, CESA wholeheartedly agrees with the statement in SCE's filed testimony that "SCE's proposals are designed to promote the EAP's [Energy Action Plan's] objective to place energy efficiency, distributed generation, and demand response ahead of building new generation resources. SCE proposes to continue offering rates

[1] The California Energy Storage Alliance consists of A123 Systems, Altairnano, Applied Intellectual Capital/East Penn Manufacturing Co., Inc., Beacon Power Corporation, CALMAC, Chevron Energy Solutions, Debenham Energy, Deeya Energy, Enersys, EnerVault, Exide Technologies, Fluidic Energy, General Compression, Greensmith Energy Management Systems, HDR, Inc., Ice Energy, International Battery, Inc., LG Chem, LightSail Energy, Inc., MEMC/SunEdison, Powergetics, Primus Power, Prudent Energy, RedFlow, RES Americas, Saft America, Inc., Samsung SDI, SANYO, Seeo, Sharp Labs of America, Silent Power, Sumitomo Electric, Suntech, SunPower, Sunverge, SustainX, Xtreme Power, and Younicos. The views expressed in this Response are those of CESA, and do not necessarily reflect the views of all of the individual CESA member companies. http://www.storagealliance.org.

and programs that encourage customers' use of cost-effective technologies that support these objectives. For example, *SCE proposes to continue offering optional rates that are attractive to customers who employ permanent load shift technologies*, and rates that benefit customers with solar/photovoltaic installations [Emphasis added]." (pp. 5-6).[2] Such encouragement requires consideration of the structure of the rates and how tariff structure can impact the economics of customer investment in distributed energy resources, including energy storage.[3] Appropriate rate design will also encourage the intelligent integration of distributed generation with energy storage to deliver optimal resulting load shapes that will not only save end customers money on their electric bills, but will also improve overall system efficiency by reducing peak demand and the predictability of that demand over time.

II. THE COMMISSION SHOULD ENCOURAGE SCE TO EXPAND ITS EFFORTS TO COMBINE THE BENEFITS OF PERMANENT LOAD SHIFTING WITH RATE DESIGN IN THIS PROCEEDING.

CESA agrees with SCE that: "Dynamic rates should complement the existing successful load control programs rather than compete with them. In other words, usage reductions in response to dynamic pricing should work in conjunction with future and existing load control programs to decrease overall usage during peak demand periods." (p. 6).[4] A key focus of SCE's dynamic rates should be on ensuring a financeable differential between peak and off-peak rates for 10-15 years, or even longer. Technologies that enable end use customers to permanently shift load are capital intensive and the primary source of cash flows that will justify the capital investment stems from the differential between peak and off-peak rates and the reduction of demand charges. This means that *consistency in the structure of any dynamic tariff* is critical to greater deployment of permanent load shifting technologies.[5]

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[2] Phase 2 of 2012 General Rate Case Policy, filed June 6, 2011.

[3] CESA also agrees with SCE that: "Rate structures should remain reasonably stable over time so that customers who make investments in facilities, equipment, and practices in response to price signals are not unduly impacted as these signals change." (p. 5).

[4] Of course, SCE also goes on to note: "This issue is currently being examined in the Demand Response Cost-Effectiveness Rulemaking, R.07-01-041. (p. 6).

[5] *See*, *Reply Comments of the California Energy Storage Alliance on Permanent Load Shifting Study*, filed March 18, 2011, at pp. 5-6.

This is not to imply that dynamic pricing tariffs should not be dynamic *per se*. The overall levels should be allowed to vary by day, season and year as required by variances in underlying cost factors such as natural gas. However, what is of paramount importance to encouraging permanent load shifting is to ensure that the differentials between peak and off-peak and the relationship between energy and demand charges remains consistent for at least 10 -15 years, or even longer. Such a time horizon is required as energy storage assets are capital intensive and long lived. Many technologies have a life cycle comparable to solar PV, as long as 20-25 years with proper maintenance.

Consistent tariff rate structures will not only help incentivize development of distributed energy resources by reducing overall tariff risk and increasing the certainty of future cash flows, they are also potentially a ratepayer neutral way of stimulating end use customer investment in highly valuable flexible energy storage assets that will be used to proactively manage and reduce peak demand in a way that is entirely performance based. Deployment of distributed energy storage throughout California's electric power system will be thus be a valuable future option for managing increases in peak load, and also dealing with the variability in peak load that will be created by the changing nature of demand due to increasing usage of electric vehicles.

III. PROPOSED CATEGORY.

CESA agrees with SCE that the Application should be designated as a "ratesetting" proceeding.

IV. NEED FOR HEARING.

At this time, CESA does not have sufficient information to know whether hearings may or may not be required.

V. ISSUES TO BE CONSIDERED.

For the reasons stated in this Response, the Commission should consider directing SCE to expand on the general comments in its Policy Testimony, and propose specific rate design concepts such as fixing dynamic pricing tariff rates for certain categories of customers such as those who employ permanent load shifting, and the use of customer sited energy storage and energy storage coupled with distributed generation.

VI. PROPOSED SCHEDULE.

At this time, CESA does not sufficient information to comment on SCE's proposed schedule.

VII. CONCLUSION.

CESA urges the Commission to consider dynamic pricing tariff structures for the purposes of encouraging permanent load shifting and the deployment of flexible distributed energy storage assets throughout California's electric power system going forward.

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July 8, 2011

Attachment B

Northeast Ohio Advanced Energy Portfolio

NorTech Energy Enterprise

Energy Storage

Serving as the focal point for Northeast Ohio's advanced energy industry, NorTech Energy Enterprise has developed a series of advanced energy roadmaps to accelerate job growth and economic impact over the next seven years. The main goal of the roadmaps is to create a detailed vision and action plan to achieve growth by focusing on Northeast Ohio's core assets, markets, strengths and competitive advantage. The roadmaps are designed to build on current , reality-based assets in the region that can be leveraged to drive growth in the cluster.

Segments

Lead-Acid Batteries **Vision:** *To become a global leader in advanced lead-acid batteries.*	This is the oldest type of rechargeable electrochemical battery often used in motor vehicle starters. Key attributes are low-cost with low energy-to-weight and energy-to-volume ratios but high power-to-weight.
Lithium-Ion Cell Materials **Vision:** *To become the leading U.S. lithium-ion materials supply region to serve domestic cell makers. From this foothold, establish a competitive position with Asian transplants.*	Rechargeable batteries in which lithium ions move from the negative to positive electrodes during discharge, and back when charging. Chemistry, performance, cost, and safety characteristics of these materials may vary.
Flow Batteries **Vision:** *To advance our position as the preeminent North American region for flow battery technology and systems.*	A rechargeable battery in which electrolyte flows through an electrochemical cell that converts chemical energy to electricity. A rapid "recharge" is possible by replacing the electrolyte while recovering spent material for re-energization.
Distributed Energy Storage Systems **Vision:** *To become one of the top 3 North American leaders for distributed energy storage systems.*	A grid connected energy storage solution (ranging from 25 – 250 kW), typically connected to secondary transformers serving a few houses or small commercial loads.

Core Organizations

Ashlawn Energy	Enersys	NASA John H. Glenn Research Center
BASF	Exide Technologies	Novolyte Technologies
Case Western Reserve University	GrafTech International	Beckett Energy Systems
Crown Battery Manufacturing Co.	InnoVentures Inc.	University of Akron
Energy Technologies Inc.	ModTech Corp.	

These NEO organizations in these 4 segments account for approximately 640 employees and $105 million in revenue in 2009 in Northeast Ohio.

Target Impact in NEO Energy Storage Sector by 2018: **Growth of 2350 Jobs**

NorTech
Energy Enterprise

Energy Storage Regional Action Plan

Lead Acid Batteries

- Secure $1-2 million in grant funding to scale up advanced lead-acid battery manufacturing
- Initiate cluster sourcing effort to integrate advanced lead-acid batteries into distributed energy storage system (DESS)
- Identify additional revenue opportunities for lead-acid-based DESS

Lithium-Ion Cell Materials

- Develop insight into U.S. cell makers, their needs, and their supply chains
- Cultivate relationships with U.S. cell makers
- Establish cluster memberships with Ohio materials companies outside of NEO
- Develop and articulate a clear NEO lithium-ion value proposition
- Initiate cluster sourcing projects to respond to domestic cell-makers' needs
- Identify and pursue grant opportunities that support NEO lithium-ion vision and strategy

Flow Batteries

- Support the success of current MW-scale demonstration by securing $3MM cost-share sources via guarantees, lease arrangements, etc.
- Influence the state regulatory/policy environment to support the technology by implementing REC market in Ohio
- Conduct Cluster Sourcing effort to reduce costs and develop supply chain
- Pursue targeted grants for research and commercialization of flow battery technology

Distributed Energy Storage System

- Identify additional revenue opportunities for DESS
- Initiate cluster sourcing effort focused on cost reduction
- Pursue targeted grant opportunities to deploy additional DESS or reduce costs
- Establish the cost / benefit case for regulators
- Influence the state regulatory/policy environment to support the technology by implementing a REC market in Ohio
- Develop and advocate for federal policies that alleviate transportation constraints and make DESS more attractive
- Connect industry requirements , including power electronics and system Integration, to curriculum at key supporting universities

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Founded in 2009, in partnership with The Cleveland Foundation and with support from the Fund for Our Economic Future, NorTech Energy Enterprise is an initiative of NorTech, a regional nonprofit technology-based economic development organization that serves 21 counties in Northeast Ohio. For more information, visit: www.nortechenergy.org

Attachment C

Northeast Ohio Advanced Energy Portfolio

NorTech Energy Enterprise

Smart Grid

Serving as the focal point for Northeast Ohio's advanced energy industry, NorTech Energy Enterprise has developed a series of advanced energy roadmaps to accelerate job growth and economic impact over the next seven years. The main goal of the roadmaps is to create a detailed vision and action plan to achieve growth by focusing on Northeast Ohio's core assets, markets, strengths and competitive advantage. The roadmaps are designed to build on current , reality-based assets in the region that can be leveraged to drive growth in the cluster.

Segments

Energy Management Systems And Services **Vision:** *To be a U.S. market leader in energy management solutions to industries, commercial enterprises, and homes.*	Devices, software, systems and accompanying services that enable monitoring, controlling, and optimizing of distributed resources and loads in a residential, commercial or industrial facility.
Smart Meter Software & Communications **Vision:** *To leverage the region's strong smart grid technology presence as part of a broader energy management systems segment.*	Meters that provide two-way communication between the consumer and, the grid, providing real-time monitoring of energy usage. Northeast Ohio's niche is the software and communications that make the meter "smart."

Core Organizations

Aclara	Emerson Network Power	Rockwell Automation
Case Western Reserve University	Intwine Energy	Novar

These NEO organizations in these 2 segments accounted for approximately 220 employees and $49 million in revenue in 2009.

Target Impact in NEO Smart Grid Sector by 2018: **Growth of 1040 Jobs**

Smart Grid Regional Action Plan

Energy Management Systems and Services

- Establish the business case and define scope for 2 targeted pilot projects
- Integrate research community, energy management system provider, and utility to develop 2-way communication approach
- Prove-out residential-scale energy management solutions for large-scale residential setting to demonstrate reduced energy consumption
- Actively seek grant funding to establish the business case and develop additional pilots
- Link energy management players across the region who currently serve the different customer segments: residential, commercial and industrial
- Create forum to share information about smart grid pilot projects launched around the region and advocate the success of NEO's pilots and the regional technologies being deployed

Smart Meter Software and Communications

- Integrate NEO smart meter software and communication technology with proposed energy management pilots to drive consumer awareness, establish a business case, and showcase Wi-Fi communications.

Contact

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Summary: Comments electronically filed by Mr. Christopher J Allwein on behalf of The Ohio Business Council for a Clean Economy