ESTABLISHING AN APPALACHIAN REGIONAL ENERGY CLUSTER

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Value Proposition

The establishment of an Appalachian Energy Cluster is considered to be a prerequisite for enhancing the viability of locating an Integrated Energy System (IES) at the U.S. Department of Energy PORTS site near Piketon, Ohio. With strong regional support and a vibrant energy sector, the PORTS site will be able to attract the multi-billion dollar investment needed to transform it into an "Energy Based Eco-Industrial Park (Center)."

The Appalachian counties of Kentucky, Ohio, Pennsylvania, and West Virginia fall within a region with abundant natural resources and infrastructure essential to the energy industry. There are leading energy industries with assets, facilities, and operations located throughout the region that would benefit by growing their businesses in the region. An Appalachian Regional Energy Cluster is designed for:

- Organizations in the energy industry or that serve the energy industry
- Organizations dedicated to building the regional economy through the energy industry
- Individuals who fill energy industry needs (e.g., infrastructure, fuels, and supply chain)

The development of such a cluster would drive energy industry growth across the region by promoting and supporting:

- Workforce development
- Energy policy
- Energy security and sustainability
- Energy technology research, development, demonstration and deployment
- Business ecosystem that encourages collaboration, integration, and innovation
- Knowledge exchange and connectivity among cluster members

This discussion paper provides background information on business clusters, their benefits and desired attributes, and the importance of nurturing cluster development to build sustainable regional economic stability. This discussion paper will serve to inform the ongoing data-driven decision processes related to site repurposing that are currently underway related to the PORTS site.

Concept and background[i]

The term business cluster, also known as an industry cluster, competitive cluster, or Porterian cluster, was introduced and popularized by Michael Porter in *The Competitive Advantage of Nations* (1990). The importance of economic geography, or more correctly geographical economics, was also brought to attention by Paul Krugman in *Geography and Trade* (1991). Cluster development has since become a focus for many government programs. The underlying concept, which economists have referred to as agglomeration economies, dates back to 1890, and the work of Alfred Marshall.

Michael Porter claims that clusters have the potential to affect competition in three ways: by increasing the productivity of the companies in the cluster, by driving innovation in the field, and by stimulating new businesses in the field. According to Porter, in the modern global economy, comparative advantage—how certain locations have special endowments (i.e., harbor, cheap labor) to overcome heavy input costs—is less relevant. Now, competitive advantage—how companies make productive use of inputs, requiring continual innovation—is more important Porter argues that economic activities are embedded in social activities; that 'social glue binds clusters together'. This is supported by recent research showing that particularly in regional and rural areas, significantly more innovation takes place in communities which have stronger inter-personal networks.

Put another way, a business (industry) cluster is a geographical location where enough resources and competences amass and reach a critical threshold, giving it a *key position* in a given economic branch of activity, and with a decisive *sustainable competitive advantage* over other places, or even a world supremacy in that field (e.g. Silicon Valley, New York City, Boston, and Hollywood). The Brookings Institute has done multiple studies and published several reports on industry clusters. One of those reports titled, "America's Advanced Industries: What They Are, Where They Are, and Why They Matter," makes a strong and independent case for establishing industry clusters.

Introduction[ii]

A cluster is a regional concentration of related industries in a particular location. Clusters are a striking feature of economies, making regions uniquely competitive for jobs and private investment. They consist of companies, suppliers, and service providers, as well as government agencies and other institutions that provide specialized training and education, information, research, and technical support.

Regional economies are the building blocks of U.S. and global competitiveness. The nation's ability to produce high-value products and services depends on the creation and strengthening of regional clusters of industries that become hubs of innovation. Clusters enhance productivity and spur innovation by bringing together technology, information, specialized talent, competing companies, academic institutions, and other organizations. Close proximity, and the accompanying tight linkages, yield better market insights, more refined researches agendas, larger pools of specialized talent, and faster deployment of new knowledge.

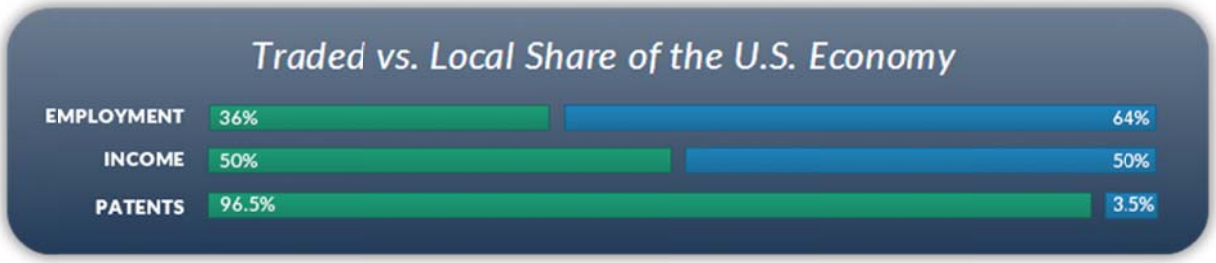
Clusters exist where the economic activities in a set of related industries in a given location reach critical mass. It is at this point that local linkages begin to have a meaningful impact on the performance of companies, and that important opportunities for local collaboration among firms and other organizations in the relevant fields arise. Clusters emerge naturally in the market process, providing productivity benefits to companies as they grow in size. They become attractive to companies looking for a new location and clusters grow through the performance of companies already located there. Companies in clusters gain access to specialized regional suppliers, service providers, and institutions, and can also benefit from deep pools of skilled employees and shared infrastructure dedicated to their needs.

As research over the past few decades has shown, clusters exist in all types of economies and are more prevalent in locations that achieve better performance relative to their overall stage of development. They play a fundamental role in driving regional economic competitiveness by encouraging higher rates of job growth, wage growth, new business formation, and innovation in the regions in which they are located.

It is more effective to view economies through the lens of clusters rather than specific types of companies, industries, or sectors. Clusters capture the important linkages and potential spillovers of technology, skills, and information that cut across firms and industries. Viewing a group of companies and institutions as a cluster highlights opportunities for coordination and mutual improvement.

Regional economies are made up of two types of clusters, each with different patterns of geographic presence and different competitive dynamics. Traded clusters are groups of related industries that serve markets beyond the region in which they are located. They are free to choose their location of operation (unless the location of natural resources drives where they can be) and are highly concentrated in a few regions, tending to only appear in regions that afford specific competitive advantages. Since traded clusters compete in cross-regional markets, they are exposed to competition from other regions. Examples of traded clusters include Financial Services in New York City, Information Technology in Silicon Valley, and Video Production and Distribution in Los Angeles. Traded clusters are the "engines" of regional economies; without strong traded clusters it is virtually impossible for a region to reach high levels of overall economic performance.

Local clusters, in contrast, consist of industries that serve the local market. They are prevalent in every region of the country, regardless of the competitive advantages of a particular location. As a result, a region's employment in local clusters is usually proportional to the population of that region. Moreover, the majority of a region's employment results from jobs in local clusters. Since local clusters are tied to the regions in which they are located, they are not directly exposed to competition from other regions.



Examples include Local Entertainment such as video rental services and movie theaters, Local Health Services such as drug stores and hospitals, and Local Commercial Services such as drycleaners.

While local clusters account for most of the employment and employment growth in regional economies, traded clusters register higher wages, and much higher levels of innovation. Local clusters provide necessary services and operate almost like a supply chain for the traded clusters in a region. Both traded and local clusters are needed to support a healthy and prosperous regional economy and for a cluster strategy to ultimately succeed.

Clusters also function as an effective instrument for public policy and industry collaboration by having the capacity to harness many different types of policies and programs directed at economic development.

While many of the benefits of clusters arise on their own, active collaboration within a cluster can enhance the returns. In some clusters, cluster initiatives have arisen that strengthen the linkages between the various members of a cluster and serve as a platform for joint action. In other regions, organizations like regional competitiveness initiatives and institutions for collaborations play a similar role.

In summary, clusters are important for the following reasons:

1. *Profile* - Clusters are the building blocks of modern economies, and they profile the economy of a location
2. *Performance* -They help drive regional economic performance, from job growth to higher wages and innovation
3. *Policy* - Clusters are a powerful tool for policy action and framework for economic development
4. *Companies* - They provide attractive opportunities for business investment, exports, site selection, and supply change assessment

Benefits of industry clusters[iii]

In general, clusters, regardless of type, can provide:

1. *Strength in numbers:* Industrial clusters can move marketplaces by the force of their combined voice, their financial muscle, their combined wisdom, and collective efforts.
2. *Action:* Move beyond good ideas to constructive actions.

3. *Networking:* Collaborate and partner with peer companies on a local, national and multi-national scale.
4. *Access:* A bigger voice creates more attention. Gain access to policymakers, industry decision makers, investors, innovative research institutions and exceptional employee candidates.
5. *Knowledge*: An informed cluster member can positively contribute to the mission of the cluster.

From an industry perspective, companies desire to stay in the same location for a long time. When this happens, over time, a natural concentration or “cluster” of specialized suppliers and skilled workers develops, along with institutions and other resources that provide specialized training and education, research and technical support to the industry. Reasons why industries collocate:

Shared Labor Pool: Businesses perform better where they can find employees with specialized skills, and workers desire to be where multiple companies available to hire them. People are also drawn to places where others share their interests and ideas. These “pools of talent” generate new ideas and attract other talented people.

Supplier Specialization: Almost every company relies on specialized supplies provided by another company. The competitive environment in clusters forces specialization of suppliers. New market demands are met more quickly and efficiently than they would be outside of the cluster.

Knowledge Spillover: The competition inside industry clusters encourages new ideas and innovation. Industry clusters also encourage entrepreneurship as workers move between employers and more easily spot opportunities to create their own companies.

From the region's perspective, there are three principal benefits of industry clusters:

1. *Industry clusters attract new companies to the region* because the suppliers and workers necessary to support their operations are already in place. In most cases, the cluster's location is also desirable because it offers easy access to research and development institutions. Cluster leaders develop institutional knowledge of the industry and become marketers to prospect companies. These concentrations of industries ensure competitive abilities to attract STEM talents and workforce competencies and skills.
2. *Industry clusters grow existing companies in the region and create jobs* because the infrastructure created by industry clusters increases the efficiency and productivity of individual companies. In turn, companies expand and create more jobs.
3. *Industry clusters make it easier to start new companies in the region* because the industry clusters create opportunities for entrepreneurs to succeed. New lines of business are more visible, and the specialized suppliers and talent pools make it easier to start a company.

Typical/desired attributes of a regional energy cluster

Designed for:

- Organizations in the energy industry, or that serve the energy industry.
- Organizations dedicated to building the regional economy through the energy industry.
- Individuals who fill energy industry needs.

Drives energy industry growth across region by promoting and supporting:

- Workforce development
- Energy policy

- Energy security and sustainability
- Energy technology research, development, demonstration and deployment
- Business ecosystem that encourages collaboration, integration, innovation, and capital investment
- Knowledge and connectivity among cluster members
- Industry-led, while many other interested parties need to be members and active participants in the cluster, industry leaders must provide the leadership.

Formation of an industry cluster

In some cases, industry leaders organize their own non-profit organization without facilitation from a third-party. However, in most cases, industry clusters are formed with the assistance of another organization who has interest in the economic development of the region and offers independent, impartial leadership. The level of assistance varies according to the cluster's stage of growth and specific needs. Since it appears that a regional energy cluster surrounding the U.S. Department of Energy PORTS site near Piketon, Ohio should include the Appalachian counties of Kentucky, Ohio, Pennsylvania, and West Virginia, a multiple state cluster will be desirable with complementary support from various DOE Program Offices and Laboratories. Due to its complexity, the formation of multi-state clusters typically require significant third-party assistance from established state and/or regional economic development entities such as Jobs Ohio or the Appalachian Regional Commission.

In the beginning, a lot of "behind the scenes" work must be done to entice key industry leaders to become interested in, and support the establishment of an industry-led cluster as a non-profit organization with an Executive Director to lead the formation and the subsequent day-to-day operation of the cluster. A draft charter and a proposed dues structure for member organizations should be developed prior to the initial "kick-off" meeting of the industry cluster.

Typically, membership dues are structured to have different membership levels based on the size and type of organization, for example:

- Large companies (e.g., greater than 1,000 employees)
- Mid-size companies (e.g., with not more than 500 employee)
- Small companies (e.g., with not more than 250 employees)
- Non-profit organizations
- Academic institutions
- Economic development organizations
- National laboratories
- Federal, state and local agencies

All key stakeholders need to be invited to the initial “kick-off” meeting for the cluster establishment and there should be opportunities for all to become involved in Committees/ Task Forces, such as:

- Economic development
- Policy
- Workforce development
- Technology development
- Innovation
- Capital networking
- Communications

Conclusion

From a general perspective, the cluster approach modernizes the Appalachian region with tools to compete in 21st century for regional, US and foreign investment dollars. A vibrant regional industry cluster will demonstrate that the industries, business leaders, and academic institutions in the region are committed to working collaboratively to create an attractive business environment that supports industry growth and long-term economic development.

From an economic development perspective, the establishment of an Appalachian Regional Energy Cluster would send a strong message to the region's existing energy industries that they are important industry sector and the region is committed to their future growth. To the broader energy sector, it sends a welcoming message that Appalachia strongly supports its energy industries and wants to create an innovative and attractive business environment within which energy related industries can work collaboratively to improve their competitiveness and expand their markets.

An Appalachian Energy Regional Energy Cluster is needed to create the business environment supportive of developing an Integrated Energy System that can take full advantage of the extraordinary industrial infrastructure of the PORTS Site and the natural energy resources available in the surrounding Appalachian region. Similar industry clusters are needed to support other regional economic development goals in advanced manufacturing and transportation/logistics.

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[i] *Adapted from https://en.wikipedia.org/wiki/Business_cluster*
[ii] *Adapted from http://www.clustermapping.us/content/clusters-101*
[iii] *Adapted from http://sccompetes.org/industryclusters/*