

## **APPENDIX L**

### **LOCAL AND REGIONAL CONTEXT AND PERSPECTIVES ON DIVERSIFYING TRI-CITIES REGIONAL ECONOMY**

## Introduction

This paper considers the economic impact on the broader regional economy and the gradual emergence of a more diversified regional economy in the Tri-Cities region of southeastern Washington State. Diversification is a key to any region's economic health. Building an economic base that relies less on DOE as a primary source of funding for the Tri-Cities (Richland, Kennewick, and Pasco) can be beneficial to the region's long-term health. In 2016, DOE, its Hanford Site contractors, and Battelle/Pacific Northwest National Laboratory, employed a total of nearly 14,000 workers in the Tri-Cities area, accounting for about 15.5% of all non-farm employment in the region. DOE and the contractors it has involved in the cleanup of the Hanford Site employ as many workers as the five largest private organizations together (Kadlec Regional Medical Center, ConAgra Foods, Tyson Foods, Trios Health, and Boetje Orchards) and two-thirds more than the combined Kennewick, Pasco, and Richland School Districts. In addition, DOE's prime contractors subcontracted work totaling more than \$400 million in 2015 to local Tri-Cities businesses. The full economic impact of DOE activities in the Tri-Cities is a multiple of the \$2.3 billion Hanford annual budget, since thousands of restaurants and other local service businesses benefit from the spending of these well-paid employees (TRIDEC 2016; DOE Outlook 2016).

To show the various influences bearing on the region's economy, this paper provides a brief overview of the following: (1) the historical context for economic diversification; (2) definitions of key terms used in regional economic analysis; (3) the role of international, national, and state forces in the Tri-Cities regional economy; (4) the role of the Hanford Site during the last half-century; and (5) the role of local stakeholders in molding a more diversified economy.

## Context

In this century, a healthy economy is defined not only by increasing gross domestic product, income, jobs and tax dollars that is the usual bottom-line measures of an economy, but also economic diversification that can buttress a region against sudden and longer-lasting economic changes. Economic diversification is not a new topic; it was a subject of study in the late 1960s. Now, however, diversification as an economic objective has become increasingly important because of the unpredictability of national, state, as well as local economies, primarily due to evidence that companies once considered stable can quickly degrade, break up, close down and/or relocate.

While much of the economic diversification literature focuses on developing nations, the concepts increasingly apply to urbanized ones (Vos 2011; Papegeorgiou 2016). Following World War II, the United States was the world's major economic power, and manufacturing centers emerged in Michigan, Ohio, and other areas of the upper Midwest, epitomized by Detroit which was touted as a world economic engine because of its production of automobiles (Thompson 1965). In those days, students of regional economics, economic geography and regional science studied how to create more economies like Detroit, Cleveland, and Akron that were manufacturing durable goods. These economic models had a large share of the world market, paid high wages, generated high tax revenues, allowing their communities to invest in art galleries, zoos, sports arenas, and other facilities that the public wanted. Regions also wanted to replicate the economic success of cities like Detroit.

Fast forward a generation. Globalization begins and cities like Detroit, Cleveland, Akron, and many others in what was once known as the American Manufacturing Belt and now known by some as the American Rust Belt. These cities have lost much of their economic base and a great deal of their population with serious consequences for their ability to maintain, much less than improve, the quality

of life in their communities. Being the economic planner for a community that has lost much of its job base and more than half of its population is a daunting challenge requiring the capacity to conceptualize and implement a plan that will work to diversify the economy in locations that have massive amounts of sunken investment in facilities and jobs that can be a drag on rebuilding an economy that is sustainable in the near and longer term.

With this context of the need for local governments to adjust to gradual and sometimes sudden economic change, this paper examines the economy of the Tri-Cities region for not only the standard metrics of economic health (e.g., jobs, income, taxes) but also for signs of economic diversification.<sup>1</sup>

Several caveats are in order. This paper was written by individuals who have visited the region on multiple occasions but are not residents of the area. In one way, this is an advantage insofar as it allowed us to consider information without having a direct local stake in the outcome. The disadvantage is that external analysts do not have all the information available to local ones. This paper is meant to identify key forces from existing literature. No new additional economic simulations were prepared to support this chapter.

## Definitions and Models

Before discussing influences on the study area, we define some key terms in order to be clear about what we mean. Three key terms are “direct”, “indirect” and “induced” economic impacts (Greenberg 2007).

Direct impacts come about from earnings and economic output at a particular location, for example, on the Hanford site. When the new groundwater treatment facility was built on the Hanford Site, some local architects, engineers, construction workers were involved. Once built, operators, maintenance staff, security, inspectors, and others have been engaged in making sure that it is operating as designed. All of this work is a direct contribution to the local economy.

Indirect impacts are dollars associated with earnings and economic output that occurs off site, for example, business services, and many other products and services that employ people in Washington and elsewhere as a result of site activities. Some of the money and benefits that the employees, companies, and stockholders of private companies earn will create jobs for local barbers, grocery store operators, wholesalers, and many others. All of these expenditures will be taxed at the national, state and local levels, and some of the taxes used to hire police, fire fighters, school teachers and many other public service employees. As the money moves through the economy, it creating new income, jobs and tax revenues, that is, it creates a multiplier.

Induced economic impacts follow from changes in earnings and benefits. If site activities add employees and raises salaries, then workers will be able to purchase more in the region. If people lose their jobs, they will reduce purchases. The ability of a site to increase indirect and induced impacts is a critical issue and typically is a disadvantage of rural areas and smaller metropolitan areas (see further discussion below).

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<sup>1</sup>Toward this end, heavy reliance has been placed on research by the State of Washington’s Economic and Revenue Forecast Council, U.S. government reports, studies completed by PNNL and TRIDEC, documents prepared by Benton, Franklin, Grant, and Yakima counties, as well as work by CRESP.

The following summary presents four economic impact tools that estimate how many dollars and jobs are created when something new is added or rebuilt, and how many tax dollars come to government officials. Regional economic impact models have also been used to understand the economic consequences of destruction caused by storms, earthquakes, human mistakes, terrorist attacks, and to estimate the benefits of investing to minimize the damage of hazard events and/or of reconstructing damaged areas. A good regional economic impact model should have these attributes (Greenberg et al. 2007):

- Ability to estimate direct, indirect and induced impacts of a new activity measured in the form of gross regional product, income, jobs, unemployment, migration and taxes.
- Ability to estimate local, regional (multi-county), state, national and international level impacts. (The last has historically not been possible to calculate, but is increasingly important and possible.)
- Capacity to estimate short-term (monthly, then quarterly), intermediate (annually for 2-5 years), and long-term (annually for five years or more).
- Ability to consider the impact of strategic investments in expanding or shrinking infrastructure, making the site more resilient and sustainable.
- Ability to isolate economic impact on already disadvantaged populations (poor, isolated and impaired as part of environmental justice)

#### *Econometric Models*

Econometric models are equations that link national, state and local capital, income, labor, taxes, spending and other critical elements of the components of an economy (Hill 2007; Judge 1982). For example, if we know that about 5% of salary increases are spent on dining out, then we can estimate how much the population will spend dining out if the average salary increase is 2%.

Econometric models typically are based on 20-30 years of historical records. If the economy is shocked by a sudden increase in energy costs, a drought that increases food prices, and the introduction of new technologies, then econometric-based estimates could mislead decision-makers. These models vary in complexity. A study conducted on the State of New Jersey used about 300 equations, whereas one on a portion of New York State had about half as many equations. A big advantage of econometric models is that they produce a time series of baseline estimates, and these baseline estimates can then be compared to the results with the new DOE project included. The difference is the impact. The major weakness of econometric models is reliance on relationships observed in the recent past.

#### *Input-Output Models*

Input-output models are in essence a massive spreadsheet of economic transactions between parts of an economy (Miller 2009). For example, a typical office is made out of wood with a veneer top. It requires glue, paint, wood, craft workers and robots to assemble the desk, and various shipments of partly and fully assembled components, financial services, and other elements before delivery. An input-output analysis begins with the proposed desk design and estimates the resources and employees needed to assemble, deliver and install the desks. These transactions lead to other purchases throughout the economy, creating a multiplier and induced effects as indirect income and jobs are created. For example, we may learn that for every \$1 invested in new desks, an additional 75 cents is added to the economy.

The biggest asset of an input-output model is the capacity to estimate the flow of goods and services in an economy. Input-output models, like econometric models, are limited by their grounding in a fixed set of economic interactions. If the economy changes, they can produce misleading results. For example, in regard to the wooden desk example, the purchaser might change to metal desks to save money, which means different flows of goods and services than with wooden desks. Input-output models normally produce a single estimate not differentiated by when those flows will occur. Some analysts use both input-output and econometric models together to compensate for the limitations of each.

#### *Regional Economic Models, Inc. (REMI) and Computable General Equilibrium Models (CGE)*

Like econometric models, Regional Economic Models, Inc. (REMI) estimates relationships among employment, income, wages, prices and other economic elements (REMI 1997; Treyz 1993). REMI has models that tie together groups of regions and states with regard to trade and migration. For example, a new massive treatment facility might be built at the DOE Hanford site. However, the design may be done at another DOE site, for example, Los Alamos. REMI builds models that tie these and other regions together and allows decision makers to understand how much interregional “leakage” occurs from one region to another when a new project is built. Specifically, by leakage we mean that some of the economic benefits occur elsewhere rather than where the facility is constructed and operated (see below for further discussion).

Computable general equilibrium models (CGE) allow users to try to account for changes occurring in an economy (Partridge 1998). The core of the CGE model normally is an input-output model. Analysts add new modeling elements that assume that the economy will shift to more efficient production processes, for example, if the price of gasoline and natural gas increases, the economy will shift to other production processes. These alternations are expressed in capital, labor, and other changes in the economic transactions tables. This assumes that the model alternations are able to capture what is actually happening or about to happen, which is not necessarily always the case.

#### **Regional Economic Influence 1: Globalization, the National Economy, and the State of Washington**

Every local jurisdiction in the United States has been influenced by globalization, a topic which receives considerable political and media attention across the United States. Globalization means increasing integration of economies across the globe through transportation and communication, as well as increasing spread of ideas and movement of population. During the 1960s, regional economics focused primarily on the impact on the United States on the world economy, paraphrasing the then popular phrase: “when America sneezes the world catches a cold.” This meant that the United States was “the” big world economic power, and when our economy has a problem, other economies get sick because Americans’ would buy less goods and services from them. However, it is also now true that the United States is vulnerable to economic upsets in Europe, China, Japan and other major economic powers. Economic problems in the United States, such as those that led to the recession in 2007-2009 reverberated across the globe, and today slowdowns in China’s economy are felt in the United States, much as the oil embargo in 1973 shocked the U.S. and many other economies. As the world has globalized, the world’s economies have felt the consequences, both good and bad.

Based on their organizational structure and publications, Washington’s State Economic and Revenue Forecast Council (hereafter referred to as the Council) appears to be one of best state-level organizations tracking, updating information about the state’s economy and providing it to elected officials, businesses and residents. The Council maintains a set of sophisticated regional impact tools that few other states have (see below for examples).

The Council's reports are grounded in U.S. government data, which they add to, as well as their own analytical capabilities (Lerch 2016; State of WA 2014; Economic and Revenue Forecast Council 2016; Hughes 1994). For example, their reports show that Washington gross domestic product grew 5.1% between 2013 and 2014, which was 10<sup>th</sup> fastest in the United States. In regard to unemployment, Washington's unemployment rates exceeded U.S. rates from 2000 to the beginning of the recession in 2007. Since the beginning of the recession, however, Washington's unemployment has closely paralleled the U.S.'s as a whole and was slightly lower. Indeed, the state's employment grew 2.8% from December 2014 to December 2015, which was 6<sup>th</sup> fastest in the United States.

Washington State has been recovering from the recession that began in 2007 more rapidly than the U.S. as a whole. Positives include a declining unemployment rate heading toward pre-recession levels and increasing wage rates. Lower oil prices helped stimulate the recovery and housing starts and sales have increased. But not all the recent international and national news has been good. The global economy has slowed, most notably in China, and U.S. gross domestic product growth has been less than hoped for, and hence economic estimates have been revised downward. The value of the U.S. dollar has increased, which has hurt exports of durable goods. The stock market's volatility signals that we lack clear markers of what is happening in the world's globalizing economy.

Despite declining exports to Canada, Japan and China, Washington State's major non-U.S. clients between 2009 and 2015, the Council expects the state's real personal income to grow more rapidly than the U.S. as a whole. However, it also notes that U.S. and Washington State expectations have been revised downward.

Like other states, Washington State's employment profile has gradually changed to increasing retail trade, leisure and hospitality service employment, and its manufacturing has declined. The forces behind these changes are global and national, and while Washington can adopt policies to adapt to global changes, it cannot singularly change global trends. Sometimes Washington's performance is better than other states and the country as a whole. Other times, it is not. Nevertheless, it is important to note that because of Washington State's strong organizational capacity in economic analysis and a process that brings these to the attention of elected officials, the state is in a good position to understand and adapt to shocks and gradual changes to the extent that adaptation is feasible.

Monitoring and understanding relationships among nations and state economies is necessary but not sufficient to fully understand local economic health. The regional economics literature has explored core-periphery linkages within states. The essence of the economic theory is that urban core areas increase their economic power, little of that growth goes to more remote areas, and indeed the core areas acquire jobs and income that otherwise would have gone to rural or smaller urban area. The alternative is that growth in core centers diffuses to peripheral locations.

Washington has a core economic center consisting of Seattle-Tacoma, similar to Chicago in Illinois and New York City in New York. Because of its analytical modelling capacity, Washington State has been able to study this issue. Hughes and Holland (1994), for example, used Washington's economic input-output models to study the core, periphery and transactions among them. They tested interactions using a decline in Boeing's aircraft sales as an illustration. The study found relatively little impact between the core and periphery, which means that the periphery will not reap the benefits of expansion, nor however will it feel the burden when the core suffers a setback.

Another element of the core-periphery dichotomy is that small economic regions have a tendency to leak jobs, income and taxes to larger core regions. For example, CRESP examined the impact of building

a new facility to manage nuclear wastes at the Savannah River site (Greenberg 2002). Economic analysis showed that the region surrounding the site would have received much less economic benefit than the cost of the project suggested because the design would not have been done in the region, and many of the workers would have been imported to construct the facility. Indeed, CRESA concluded that if the Savannah River site budget was held constant, the region would have been better off economically continuing existing projects, which had a much larger local multiplier and less leakage to nearby core areas like Atlanta. This example is not meant to imply that any project currently underway or proposed for the Hanford site has a great deal or little economic leakage because we have not studied that issue. It is meant to underscore the fact that large metropolitan regions will be able to multiply investments into more local economic benefits than the same project in a smaller region, or looked at this from another perspective it requires more federal economic stimulation to achieve the same economic benefit result in a rural or smaller metropolitan region than in a larger one.

The State of Washington's modeling capacity can be used to assess the core-periphery issue in regard to the Tri-Cities region, if indeed there is a meaningful one. For example, even though the Council's data shows that Washington's unemployment has been falling faster than the U.S. as a whole, the Council data also show that the Tri-Cities seasonal unemployment rates for December 2015 for the Tri-Cities and Yakima were 6.6% and 7.9%, respectively. This compares to 4.6% for Seattle. This notable difference would be valuable to better understand using Washington's sophisticated models. In other words, this issue would benefit from additional research.

### **Regional Economic Influence 2: The Department of Energy (DOE)**

During the last three plus decades, there have been several major sources of research on the economic impact of DOE Office of Environmental Management sites on their surrounding regions, including Hanford. Scott et al (1989) noted that Hanford is the major employer in the Tri-Cities region. From the perspective of the years, 1987-1988, this study noted the closing of several key facilities and that the region is in a transition to a more diversified economy. Part of the transition is more housing construction, agriculture, increasing tourism, and the growth of retirement communities in the region. Yet, the reality is in this region from September 30, 1987 through December 31, 1988 employment decreased 2,200 jobs at a time when the State of Washington as a whole increased jobs 4%. Scott et al. also reported decreases in earnings, housing prices, and school enrollments. They expected additional decreases. This early study is a snapshot of the Tri-Cities regions during a period when the national private funded economy was expanding while the government supported one was contracting in this location.

DOE's investments and disinvestments are apparent in the regional economy. Beginning in 1996 and ending in 2004, CRESA published multiple papers on the subject of regional economic impact at DOE EM sites, focusing primarily on Hanford, Savannah River, Oak Ridge, and Idaho regions, but also Rocky Flats, Los Alamos and Sandia, the Nevada Test site, Fernald, Mound, Portsmouth, Pantex, Lawrence Livermore and Sandia (California), Argonne, and Pittsburgh/Morgantown (Frisch et al 1998, 2000; Greenberg 2010; Greenberg, Mayer & Lewis 2004; Greenberg et al 1998, 1999a, 1999b, 2000, 2001, 2002a, 2002b, 2003a, 2003b; Lewis, Frisch & Greenberg 2004; Lowrie & Greenberg 2000, 2001; Mayer & Greenberg 2000, 2002; Miller et al 2004; Solitare et al 2000. Their focus was on the first four sites because it was believed that DOE would be there for many years and make major investments. The CRESA studies used interviews, reviews of plans, and a novel statistical approach to try to better understand the history and more importantly the future economic assets of these regions.

For example, one of these studies offered a different way of looking at the Tri-Cities and other regions with major EM sites through a counterfactual analysis (Greenberg et al 1998, 1999). It created a counterfactual history of how the DOE-centered county would have developed in regards to jobs and income without the DOE site. The study used a systematic approach to identify 20 counties that were close approximations to each county in a DOE-host region. Thirteen indicators in four categories were used to pick the 20 counties for each of the 22 the DOE host counties:

- Urban factor location: Distance from the nearest city of 250,000 and nearest city of 100,000, and aggregate population of the counties within 500 miles of the county;
- Population: Number of people in the county and county population change;
- Economic focus: Total earnings from agriculture, manufacturing, and government; and
- Income: Income and income change.

The data for each US County was compared to each DOE host county. Twenty U.S. counties not within 50 miles of the DOE county in the study that were most similar to the DOE county in 1950 were selected and compared to the host DOE county for the period 1970-1994. The average of the 20 counties for each DOE county was the counterfactual profile for each DOE county. This analysis was completed for 22 counties at the DOE Hanford, Savannah River, Idaho National Laboratory, Oak Ridge, and Rocky Flats sites. Table 1 lists summary results for the four counties in the Hanford region.

**Table 1. Selected Results of Four Hanford-Region Counties and Counterfactuals\*\***

County	1970-1974		1975-1979		1980-84		1985-89		1990-94	
	Jobs	Income	Jobs	Income	Jobs	Income	Jobs	Income	Jobs	Income
Benton	8	10	1	0	1	1	1	2	1	1
Franklin	3	16	3	7	5	6	4	9	2	4
Grant	12	13	17	17	17	17	16	16	14	14
Yakima	15	18	11	12	11	12	9	12	11	9

\*Source: Greenberg et al. 1999, Table 3.

\*\*Numbers in table are ranks compared to 20 counties for each county. 0=best economic performance, 20=worst economic performance.

As a set, these four DOE-region counties and the other 18 counties show that the assertion that areas near DOE former weapons sites are economically unhealthy is an inaccurate generalization. Benton County, in fact, was economically the healthiest among the 22 counties evaluated, and Franklin also did quite well when compared to its counterparts. Yakima started out as among the least economically successful and improved its position relative to its 20 counterparts. DOE investments in the Hanford site in 1972 provided a stronger economic benefit to Benton and Franklin counties than to Grant and Yakima counties which were less connected to the DOE sites. This counterfactual method has the advantage of comparing each county to other counties that were relatively similar to it before DOE investments heavily impacted the area, and it allows the user to see changes as the DOE changed its investments. Another way of looking at these results is that the period of the late 1970s and 1980s was a period when the private investment that was driving economies in many areas in the U.S., especially in the American manufacturing belt were badly impacted by deindustrialization. By comparison, it appears that Benton and Franklin counties were buttressed by DOE investments at Hanford, at least during this period.



This study has not been updated for these sites, and such a study would provide state and local planners with insights about the impact of DOE's Hanford investments and the Tri-Cities' efforts to diversify the regional economy.

In *The Impact of DOE Sites on Their Local Economies* (DOE 2013b), a study done for the DOE, used Regional Input-Output Modeling System (RIMSII) multipliers derived from input-output tables for its economic impact analyses. This economic analysis tool is grounded in detailed knowledge of business transactions. The output measures are jobs, unemployment, and to a lesser extent income. The primary difference between the CRESP and DOE studies is that CRESP assessed the economic impacts of job reduction and creation programs and followed them for 10 to 25 years.

Notwithstanding some differences in the objectives and the tools used by CRESP and the DOE studies and the fact that the DOE time period begins about when CRESP's stopped, the reality is that the results are not very different. The DOE report series begins in 2003 and runs through 2012. The results are valuable in underscoring the regional economic importance of the Waste Treatment Plant (WTP) facilities being built to treat the waste in the underground tanks. The CRESP analysis estimated that 14.3% of regional employment and 24.2% of compensation is directly and indirectly related to the Hanford site.

The DOE report indicates that in fiscal year 2012 there were 427 DOE employees at Hanford, 10,398 prime contractors, and 1,197 non-DOE tenant employees. Also, there were 2,450 construction workers. All the facilities are not on the DOE site. The report indicates that there were 10 non-DOE facilities at Hanford, including an observatory and an electricity generating station.

The RIMSII multipliers assume that every DOE on site job creates another 0.583 jobs. In other words, DOE had 12,000 jobs and another 7,000 were indirectly created. Also, the report shows 2,500 construction jobs, which they calculate implies another 1,500 indirect jobs. These total 23,000 jobs that are associated directly and indirectly with Hanford. In the context of the Hanford region, they are similar to the CRESP studies estimated for a decade earlier.

The DOE report notes that site employment decreased from 11,651 in 2003 to 10,398 in 2012. This, the report asserts, increased unemployment by 1% (adding indirect impacts). One of the last sections of the report suggests that 2,000 jobs would be created by operating the Waste Treatment Plant (WTP), and these jobs would partly compensate for the almost 2,500 construction jobs that would be lost. The net effect of building and then operating the WTP, they calculate, would be to decrease the estimated unemployment rate in 2016 from 10.9% to 9.3%. Of course, the plant is not yet operating, and so its operating economic impact cannot yet be measured. The current thinking is that as construction is completed on the WTP LAW Vitrification Facility, the workforce will shift to the HLW Vitrification Facility construction, and then to completion of the remaining parts of the WTP.

The socioeconomic status of regional population is always important. The area this report calls the Hanford-region has demonstrated wide variation in socioeconomic status of residents. For example, in 1989, Benton County ranked third in median household income among Washington's 39 counties. Estimates for 2012 and 2013 also place it third in the state. Benton's income is over 10% higher than Washington State's as a whole. In contrast, income in neighboring Walla Walla, Grant, Adams and Klickitat counties was about 20% lower.

Summarizing, the CRESP and DOE economic studies depict a region that has had economic swings when measured by common indicators of employment, unemployment rate, job growth, income and regional

domestic product. Yet, overall, the area that directly and indirectly benefits from DOE and PNNL's presence is doing better economically than most others.

The problem with economic simulation studies is where we start the simulation period, what assumptions are made about future supply and demand for products, and assumptions about the U.S. economy. As valuable as these may be in getting people to think and talk about the area, the results cannot be taken at face value. They are only as good as the assumptions about how the federal and state governments will perform.

We also know that there is no recession proof economy, even one the size of the United States, especially in a globalizing economy that cannot be controlled by the United States as much as it could two generations ago. In the section that follows we assume that the U.S. economy will not be seriously hampered by another major recession, or dramatically altered by war.

Overall, there is considerable evidence that Washington State officials have the capacity and will to support the mid-Columbia River economic region. The state's economic group has an important role to play across the state and has economic tools that can support this effort. At the national scale, Washington's governor and other elected officials have continued to assert a need for a large share of the DOE Office of Environmental Management shrinking budget.

### **Regional Economic Influence 3: Local Efforts**

Because of decades of cycles of growth and decline, the Tri-Cities region has been trying to build a diversified economy, one less dependent on the DOE, while also continuing to argue for continuing DOE Office of Environmental Management support at the highest levels of government. In 2000, 2010, and 2015, the four counties (Benton, Franklin, Grant and Yakima) had a total population of 489,000, 585,000, and 620,000, respectively, an increase of 27 percent.

Documents prepared by the Tri-Cities Development Council, county planners, chambers of commerce, tribal nations, and others suggest that they have been focusing on natural assets and man-made ones, at least partly the legacy of the highly qualified and paid people it drew to the Hanford site and the Pacific Northwest National Laboratory. Four local economic growth objectives appear to have wide, although not necessarily, complete support:

- Agriculture, including wine production,
- Tourism,
- Caring for senior citizens and health care, and
- Science and Technology

Agriculture has a long history in region, including the production of wheat, corn, apples, and grapes for its wine industry. A challenge not only for irrigated agriculture but also for fishing, recreation, hydroelectric power, and other potentially competing consumptive water uses is how to use a limited supply of water. Barnett et al. (2005) identify the Columbia system as one that by 2050 could be seriously impacted by less and earlier snow melt, which in turn, would force users along the river to make difficult decisions about priorities among agriculture, recreation, hydropower and others.

Tourism is a logical choice in an area with a great deal of sunshine and not much rain. Even when temperatures exceed 100 °F during parts of the summer, the heat is dry, unlike that west of the mountains and in many other parts of the United States. The Tri-Cities region has many wineries, breweries, bed and breakfasts, hotels, fishing, water recreation and other opportunities. County and local government have been expanding a network of parks along more than 100 miles of rivers. As long

as the tourist industry is not devastated by a major hazard event, gasoline prices do not increase to the point where people are reluctant to drive to this area, and a serious extended recession does not occur, the Tri-Cities region can draw people from all over Washington, Oregon, parts of California, and states to the east. The middle Columbia River basin should be able to continue to build and enhance a sustainable tourism industry.

The U.S. Census middle range population estimates are that the population of senior citizens will double from 43 million in 2012 to 84 million in 2050, which represents an increase from 13.7% of the national population to 20.9% (Orttman 2016). Health care, including assisted living facilities, retirement communities, and similar facilities is a logical growth industry for this area because of its location in a dry and sunny area within a relatively short distance from western Washington, Oregon and California. Research shows that the current senior population has accumulated a great deal of wealth and has often chosen to live in areas with a high risk of tropical storms and other hazard events (Greenberg 2014). This region area of Washington faces threats from earthquakes, fires, and floods, but in comparison to other areas of the United States habitually at risk from tropical storms and tornadoes this area should be a relatively lower risk area.

Attracting more senior citizens will take considerable effort. The Milken Institute (Chatterjee 2014) compared 252 areas for what it called “Best Cities for Successful Aging.” Using indicators such as health care, wellness, living arrangements, transportation convenience and others, the Tri-Cities area ranked 188 for seniors. In other words, the study region has work to do to raise its comparative position closer to cities Madison (WI), Ithaca (NY), Lubbock (TX), Morgantown (WV), and Lincoln (NB). The high-ranking areas typically are county seats, or state capitals, and have major large university facilities nearby.

Agriculture, tourism, and hosting seniors are three activities should be cornerstones for the Tri-Cities region help the area survive the inevitable economic hiccups of the U.S. economy and the ups and downs in DOE funding of the Hanford facility. If there is a gamble in the plan, it is in the efforts to build the Tri-Cities region into a high-tech innovation center. It is hard to object to the goal. However, the competition is fierce. Nations, states, local governments, and private organizations have been targeting this industry. Is there a good reason and evidence that a region centered around three cities with a population of about a quarter of a million can be successfully in attracting hi-tech industry? PNNL makes a strong case that southeast Washington is already succeeding. PNNL asserts that, unlike most other technology clusters, this one is not grounded in computer software design and engineering, but rather in physics, chemistry and materials engineering. It rates the region high in quality of life and in recent business growth. The major disadvantage PNNL points to is lack of financial capacity to fund creative ideas and/or to receive support from key industry backers, unlike Silicon Valley, the Seattle region and other hi-tech magnets.

The Milken Institute’s best city rankings suggest that the Tri-Cities have been doing really well in this effort. Out of 200 large cities, the Tri-Cities ranked 6 and 5, respectively in 2009 and 2010, respectively, in creating and sustaining jobs, doing especially well in high tech industry. The year 2015 update dropped their ranking to 83 out of 200. But in wage growth the region ranked 16 and in high-tech GDP concentration Tri-Cities ranked number 44. These fluctuations are not surprising in small regions, but a good start has been made in this area, as PNNL asserted in its 2010 report (PNNL 2010).

One reason for optimism is public support. In 2009, the DOE presented the idea of turning some of its former weapon site areas into hi-tech energy research centers. CRESP conducted a survey of 3,103 U.S. residents living in six regions with DOE sites, finding the strongest support for new energy parks idea in the Hanford-centered area. Specifically, 29% of U.S. residents and of residents of five other DOE-

centered regions favored an energy park in their area compared to 45% in the Hanford-centered region (Greenberg 2010).

## Discussion and Conclusions

A 2012 article in the *Oregonian* (Cockle 2015) characterized the Tri-Cities region as the “nation’s fastest-growing metro area.” The author assumed the Tri-Cities will receive \$3 billion a year from the DOE in the future. He noted that “no doubt the Tri-Cities would be smaller and poorer today had it not been for the 1945-1991 Cold War and the arms race between the United States and the Warsaw Pact nations.” Cockle adds that it was the nation’s fastest-growing metropolitan area from 2010 to 2011, adding a rating as one of the top 10 places in the nation to raise a family by Kiplinger and one of the top 10 likeliest places to make gains in housing values by CNN/Money. *Forbes Magazine* ranked the Tri-Cities as the “11<sup>th</sup> geekiest” community in America because of the concentration of well-educated residents. Noting that the area averages 300 days of sunshine a year and has multiple golf courses, marinas along the Columbia River, and few traffic problems, the article concluded that this is “a place with undeniable appeal.”

In essence, this article is a summary of the economic plan for this area.

- Expect the DOE Office of Environmental Management program to provide billions of dollars a year for the foreseeable future and expect PNNL to continue to be a strong presence in the area. These are twin regional cornerstones.
- Use natural resources wisely to stimulate selected areas with potential for agriculture, tourism, and attract seniors and others currently living in less desirable and more expensive areas to this weather friendly region; and
- Press hard to continue to attract high technology industry that does not directly compete with existing clusters in Seattle and Silicon Valley, and offer specialties built upon work at Hanford and PNNL.

Assuming that the State of Washington’s elected administration continues to try to build up the Tri-Cities region, its congressional delegation continues to be as successful in obtaining federal funding for cleanup in the past, the State government maintains its strong economic research arm, and local groups continue to cooperate to build and press their agenda, there is every reason to believe (1) that a diversified regional economy can continue to be built and (2) the economy that emerges will be more resistant to economic shocks and destabilizing trends than the vast majority of other, similarly sized regions in the country.

## REFERENCES

- Barnett T, Adam J, Letenmaier D. Potential impacts of a warming climate on water availability in snow-dominated regions. *Nature*. 438, 303-309, 2005.
- Chatterjee A, King J. *Best Cities for Successful Aging, 2014*. Milken Institute, [successfulaging.milkeninstitute.org/2014/beswt-cities-for-successful-aging-report.2014.pdf](http://successfulaging.milkeninstitute.org/2014/beswt-cities-for-successful-aging-report.2014.pdf). Accessed June 21, 2015.
- Cockle R., Tri-Cities Combine for Nation's Fastest-Growing Metro Area, Boosted by Federal Money to Mop Up Hanford. *The Oregonian*, December 6, 2012. [www.oregonlive.com/pacific-northwest-news/index.ssf/2012/12/](http://www.oregonlive.com/pacific-northwest-news/index.ssf/2012/12/) Accessed June 16, 2015.
- DeVol R, Bedroussian A, Klowden K, Flor Hynek C. *Best-Performing Cities 2010: Where America's Jobs Are Created and Sustained*. [www.milkeninstitute.org/about/about.taf?](http://www.milkeninstitute.org/about/about.taf?) Accessed June 21, 2106.
- Economic and Revenue Forecast Council. Washington State Economic Revenue Forecast, 38(3), 2015. Olympia, Washington. [www.erfc.wa.lgov](http://www.erfc.wa.lgov). Accessed June 15, 2016.
- Enhanced recreational opportunities at U.S. DOE sites: Economic evaluation of an alternative land-use scenario at the Savannah River site, *Federal Facilities Environmental Journal* Winter 2000, 51-71.
- Frisch M, Solitare L, Greenberg M, Lowrie K. Regional economic benefits of environmental management at the U.S. Department of Energy's major nuclear weapons sites, *Journal of Environmental Management* 54, 1998, 23-37.
- Frisch M, Solitare L, Greenberg M, Lowrie K, Impact of providing off-site economic development funds to dependent regions surrounding the U.S. DOE's major nuclear weapons sites, *Journal of Policy Analysis and Modeling*, 22(7), 2000, 801-819.
- Greenberg M, Isserman A, Krueckeberg D, Lowrie K, Mayer H, Simon D, Sorenson D. Socioeconomic impacts of U.S. nuclear weapons facilities: a local scale analysis of Savannah River, 1950 to 1993, *Applied Geography*, 18, 1998, 101-116.
- Greenberg M, Isserman A, Frisch M, Krueckeberg D, Lowrie K, Mayer H, Simon D, Sorenson D. Questioning conventional wisdom: the regional economic impacts of major U.S. nuclear weapons sites, 1970-1994, *Socio-Economic Planning Sciences*, 33 (3), 1999a, 183-204.
- Greenberg M, Solitare L, Frisch M, Lowrie K. Economic impact of accelerated cleanup on regions surrounding the U.S. DOE's major nuclear weapons sites, *Risk Analysis*, 19(4), 1999b, 629-641.
- Greenberg M, Frisch M, Solitare L, Lowrie K, Downsizing US Department of Energy facilities: evaluating alternatives for the region surrounding the Savannah River nuclear weapons site region, *Evaluation and Program Planning*, 23, 2000, 255-265.
- Greenberg M, Lewis D, Frisch D, Regional economic impacts of environmental management of radiological hazards: an initial analysis of a complex problem, *Environmental Planning and Management*, 44 (3), 2001, 377-390.

Greenberg M, Lewis D, Frisch M, Lowrie K, Mayer H. The US Department of Energy's regional economic legacy: spatial dimensions of a half century of dependency, *Socio-Economic Planning Sciences*, 36, 2002a, 109-125.

Greenberg M, Lewis D, Frisch M. Local and interregional economic analysis of large US Department of Energy waste management projects, *Waste Management*, 22 (2), 2002b, 643-655.

Greenberg M, Miller KT, Frisch M, Lewis D. Facing an uncertain economic future: environmental management spending and rural regions surrounding the U.S. DOE's nuclear weapons facilities, *Defense and Peace Economics*, 14(1), 2003a, 85-97.

Greenberg M, Lowrie K, Frisch M, Lewis D. National government policy options for contributing to regional economic stability: the U.S. Department of Energy's major nuclear weapon sites, *Review of Policy Research*. 20(4), 2003b. 647-670.

Greenberg M, Mayer H, Lewis D. Life-cycle cost in a highly uncertain economic environment: the case of managing the U.S. Department of Energy's nuclear waste legacy, *Federal Facilities Environmental Journal*, Spring, 2004, 67-82

Greenberg M, Lahr M, Mantell N. Understanding the economic costs and benefits of catastrophes and their aftermath: a review and suggestions for the US federal government. *Risk Analysis*. 27 (1), 2007, 83-96.

Greenberg M, Energy Parks for Former Nuclear Weapons Sites? Public Preferences at Six Regional Locations and the United States as a Whole, *Energy Policy*, 38, 5098-5107, 2010.

Greenberg M. *Protecting Seniors Against Environmental Disasters: From Hazards and Vulnerability to Prevention and Resilience*. Routledge, Earthscan, 2014.

Hill C, Griffiths W, Lim G. *Principles of Econometrics*. 3<sup>rd</sup> edition. NY, Wiley. 2007.

Hughes D, Holland D. Core-Periphery Economic Linkage: A Measure of Spread and Possible Backwash Effects for the Washington Economy. *Land Economics*. 70(3), 364-377, 1994.

Judge C, Hill R, Griffiths W, Lutkepohl H, Lee T. *Introduction to the Theory and Practice of Econometrics*. NY, Wiley, 1982.

Lerch S. Washington State Economic and Revenue Forecast, Seattle, WA: Economic and Revenue Forecast Council, March 10, 2016. PowerPoint. <http://www.erfc.was.gov>. Accessed June 15, 2016.

Lewis D, Frisch M, Greenberg M, Downsizing and worker separation: modeling the regional economic impacts of alternative Department of Energy workforce adjustment policies, *Regional Studies*, 38(1), 2004, 67-83.

Lowrie K, Greenberg M. Local impacts of US nuclear weapons facilities: a survey of planners, *Environmentalist*, 20 (2), 2000, 157-168.

Lowrie K, Greenberg M. Can David and Goliath get along?: Federal lands in local places, *Environmental Management* 28(6), 2001, 703-711.

Mayer H, Greenberg M. Responding to economic change in remote rural regions: federal installations in Idaho and Washington, *Journal of Rural Studies*, 16, 2000, 421-432

Mayer H, Greenberg M. Infrastructure planning in an uncertain environment: the nation's former nuclear weapons production sites, *Public Works Management and Policy*, 7(2), 2002, 138-154.

Miller KT, Lewis D, Frisch M, Greenberg M, Innovative worker separation, severance policies, and economic migration at U.S. Department of Energy sites, *Applied Research in Economic Development*, 2(1), 2004, 3-16.

Miller R, Blair P. *Input-Output Analysis: Foundations and Extensions*. 2<sup>nd</sup> edition. NY, Cambridge University Press, 2009.

Orttman J, Velkoff V, Hogan H. An Aging Nation: The Older Population in the United States. P25-1140, 2014. [www.census.gov/prod/2014pubs/p25-1140.pdf](http://www.census.gov/prod/2014pubs/p25-1140.pdf). Accessed June 21, 2016.

Pacific Northwest National Laboratory. *Tri-Cities Index of Innovation and Technology*. PNNL-20122. Richland, Washington, 2010.

Papageorgiou, C, Spatafora N. *Economic Diversification in LICs: Stylized Facts and Macroeconomic Implications*. *IMF Staff Discussion Note*. International Monetary Fund. December 14, 2012. [www.imf.org/external/pubs/ft/sdn/2012sdn1213.pdf](http://www.imf.org/external/pubs/ft/sdn/2012sdn1213.pdf). Accessed June 20, 2016.

Partridge M, Rickman D. Regional Computable General Equilibrium Modeling: A Survey and Critical Appraisal. *International Regional Science*, 21(3), 205-248, 1998.

REMI, Inc. *The REMI EDF5-53 Forecasting & Simulation Model*, Volume 1, Model Documentation, chapter 4. Amherst, MA: Regional Economic Modeling, 1997.

Scott M, Belzer D, Marsh S, Beck D, Schultz R, Harkreader A. *Hanford and the Tri-Cities Economy: Review and Outlook, March 1989*. PNL-6813, UC-2. Pacific Northwest Laboratory, Battelle Memorial Institute, Springfield, VA, National Technical Information Service.

Solitare L, Lowrie K, Frisch M, Greenberg M, Noah JC, Burger J., Enhanced recreational opportunities at U.S. DOE sites: Economic evaluation of an alternative land-use scenario at the Savannah River site, *Federal Facilities Environmental Journal* Winter 2000, 51-71.

State of Washington, Median Household Income Estimates by County: 1989 to 2012 and Projection for 2013. <http://www.ofm.was.gov/economy/hhinc/medinc.pdf>. Accessed May 20, 2014.

Thompson W. *A Preface to Urban Economics*. Baltimore, MD, Johns Hopkins University Press, 1965.

Treyz G.. *Regional Economic Modeling: A Systematic Approach to Economic Forecasting and Policy Analysis*. Boston, MA: Kluwer Academic Publishers, 1993.

Tri-Cities Development Council (TRIDEC) 2016 Fact Sheet, <https://www.tridec.org/fact-sheet/>.

US Department of Energy. *The Impact of DOE sites on their local economies*, phase II report, December 2013. Paper copy.

US Department of Energy, *Hanford Site Outlook*, Tri-Cities Regional Economic Outlook, January 20, 2016.

Vos R, Koparanov M. *Globalization and Economic Diversification: Policy Challenges for Economies in Transition*. London, The United Nations Series on Development, Bloomsbury Press. 2011.