

## **Attachment E: Business Plan**

### **Introduction**

The Port of Whitman County has been a strong supporter of the State's Innovation Partnership Zone program since its inception and believes that innovation and technology commercialization form the cornerstone of future economic development activity. Even though resources from the State have been limited, the Port has and will continue to invest resources into supporting the program and moving the initiative forward. However, with the current resource limitations, the business plan for the next four years must be split into two segments: 1) A "bootstrap" plan, which makes the best possible use of the limited resources currently available to grow and expand from the existing core of near-term opportunities; and 2) An "expanded" plan that would be enabled by new resource allocations that may come available during the next four years to accelerate growth and expand opportunity pursuits into more mid-term and longer-term investments.

In addition to resource limitations, the Pullman IPZ has some unique characteristics which impact the strategy going forward. First and foremost, the Pullman IPZ has a tremendous asset in the close relationship and physical proximity to Washington State University (WSU), a world class research institution. This provides a strong influx of funding from outside sources that creates a steady stream of innovative research and development that may be commercialized for economic benefit. However, on the downside, the geographic isolation, limited access to capital, and limited business base located within the zone necessitates that the Pullman IPZ form strong linkages with other IPZ's, financing sources, and businesses outside the zone. Thus, the core of the Pullman IPZ plan going forward is based on specific technology or cluster pursuits that provide the strongest commercial opportunities, independent of location.

### **Mission**

The mission of the Pullman IPZ focuses on accelerating the commercialization of Clean Technology research and development underway in the College of Engineering and Architecture at Washington State University. In addition to continuing previous IPZ initiatives, for the next four years, the focus will be primarily directed towards the expansion and commercialization of Smart Grid and Smart Farm/Smart Home technologies. The order listed is representative of near-term, mid-term, and longer-term focus. The rationale for this focus is related to leveraging the core strengths of existing zone partners in business, and the status of technology readiness of the related university research initiatives.

### **Goals**

The primary goal of the Pullman IPZ is to focus on accelerating commercialization and economic growth around the identified technologies. In addition to this primary goal, specific goals for the next four years are highlighted below:

1. Increase occupancy of the Pullman IPZ Headquarters from 50% to 100%.
2. Facilitate the formation of one to three new start-up ventures per year.
3. Improve success of commercialization of University technologies.
4. Improve collaboration among the partners.

### **Leadership/Governance**

The Leadership of the Pullman IPZ has not changed over the last four years and is expected to remain in place for the next four year period. The Pullman IPZ governance and compliance with state regulations is the responsibility of the Port of Whitman County, which is managed by Executive Director, Joseph Poiré, with the Port Commissioners providing governance and oversight. All budgets and expenditures are reviewed and approved by the Port Commissioners at bi-monthly meetings.

- **Description of management team and roles**

The Pullman IPZ management team includes Donald Tilton, Joseph Poiré, and Kara Riebold. Don, Joseph and Kara have formed the IPZ execution team for the last four years, and collaborate on strategy, planning, grant writing, and all management and execution of IPZ projects and initiatives. Joseph serves as the Executive Director of the Port of Whitman County and will focus on policy initiatives as well as management of the IPZ related fiber optic project and real-estate infrastructure efforts. Don manages the general IPZ activities under contract to the Port and will continue to do so in the upcoming period, focusing on clean technology initiatives. Don provides entrepreneurial guidance to new business start-ups, including teaching the Technology Ventures class for the Harold Frank Engineering Entrepreneurship program. Don maintains close relationships with the University researchers in the fields of IPZ focus and will focus on identifying the most promising technologies for commercialization, and the most appropriate pathways, whether through licensing to existing partners and companies or the formation of new business enterprise. Don and Joseph also collaborate on initiatives to attract new companies into the Zone and find opportunities to expand collaboration within the zone. In addition, Don participates in annual Port strategy meetings, providing guidance on the most promising IPZ pursuits. Kara assists in identification of opportunities, general administrative support and grant writing activities.

- **Anticipated partner involvement and investment**

SEL and Avista are deeply involved in Smart Grid initiatives, and both firms invest millions of dollars annually in research and development in the area. Funding in the University in the topic areas of interest currently exceeds \$10M, and the WSU foundation has an initiative underway to raise a goal of \$15M for new Smart Farm initiatives.

In addition to private entity and University investment, under the “Bootstrap Plan,” the Port of Whitman County is committed to dedicating the following cash and in-kind resources to furthering the mission of the IPZ program.

1. The Port will provide up to \$15K annually to cover part-time administration. This equates to about ½ day per work week.
2. The Port will commit an additional \$30K of in-kind staff time, or up to 1 full day per week.
3. The Port will invest about \$10K per month in maintaining the availability of the Small Business Incubator space, including providing co-located office space for SEWEDA staff.
4. The Port will provide an additional \$10K annually for SEWEDA staff support.
5. The Port will provide \$15K annually to support the WSU Business Plan Competition. In the past, this support and the competition itself have resulted in the formation of viable businesses that are now contributing economically to the region.
6. The Port has \$15M in bonding capacity to apply to major projects that may arise in the Zone.
7. The Port has \$2.7M in cash reserves that could be available for IPZ projects if there is co-investment from the private sector.
8. The Port has budgeted up to \$1M/year for capital improvement projects in the Zone.

Due to the difficult economic conditions, the Port Commissioners have agreed to drop the floor return for project approval for items 6) through 8) from 7%, down to 2%. This will enable resources to be applied to projects that would have otherwise been declined in the past. This decision is based on Commissioners strong support of IPZ and the urgent need to stimulate more economic growth in the region.

Under the “expanded plan” the Port will seek to find outside funding sources to increase staff support and accelerate IPZ initiatives. In combination with the resources already committed, the following additional resources would enable more dedicated efforts to growing IPZ success.

1. Operating funds of \$250K annually to hire a full-time Zone administrator and full-time grant writer.
2. Creation of a low interest revolving loan fund of up to \$1M annually that would be available to companies in IPZ start-ups.
3. Creation of a grant fund of up to \$1M that could provide matching funds to stimulate seed capital private investments targeted towards new business start-ups in IPZ technology focus areas.

- **Sustainability plan over the next four years**

The Port's commitment of the above resources will enhance sustainability of the IPZ. In addition, the Port is willing to increase resources devoted to the IPZ in relation to successful accomplishment of goals. For increases in lease revenues in IPZ buildings, the Port will re-invest 20% of revenues annually to increase IPZ administration budget.

### **Strengths of the IPZ**

The primary strength of the Pullman IPZ stems from the proximity to WSU, a world class research institution. The specific strengths in Technology, Human Capital, and Infrastructure that will be leveraged for the next four years are highlighted below.

- **Technology**

In the area of technology, the Pullman IPZ will focus on leveraging the large influx of funding in the areas of Smart Grid, Smart Farm/Smart Home technologies. WSU is a world leader in these fields, and in the IPZ region and in the institution, funding levels and private investments exceed well over \$50M.

### **1. SMART GRID**

The primary concept for this category of pursuit is to leverage the \$39M Pullman Smart Grid Project to demonstrate advanced technologies and concepts in renewable energy, energy storage, load control, energy efficiency. The primary purpose of the efforts will be focused on creating real world quantifiable case studies that will be beneficial in assisting the partners with broader commercialization efforts. The core team of Avista, Itron, SEL, WSU and PNNL, are smart grid leaders and give us a great foundation to be competitive. The \$39M program is very exciting for our region. However, it is solely a smart metering project. The project currently includes no advanced technology demonstrations. A recent article in smart grid news, entitled, "Beyond Metering: 10 Pretty Darn Interesting Stimulus-Funded Smart Grid Projects" highlights over \$220M in recent smart grid related stimulus funded technology efforts. No projects or technologies from our region were funded or represented! If our region is going to be competitive in the future, we must develop structured teams and processes to successfully compete for these resources to better position our technology companies to maintain leadership. The Pullman Smart Grid infrastructure, and the core team involved that were created to pursue the \$39M program could be utilized as a framework or foundation to pursue additional funding that highlights some of our other area companies and technologies, and provide greater resources to them for successful commercialization. Five such concepts are briefly described below:

#### **A. ADVANCED ENERGY EFFICIENT LIGHTING DEMONSTRATIONS**

The Pullman Smart Grid demonstration program creates a unique framework that will enable new clean technologies to be demonstrated in a way that enables benefits to be quantified. Flyback Energy has developed a new lighting controller and is in the early stages of commercialization. The controller enables unique benefits in comparison to existing lighting controllers. It is functional with multiple lighting types, is more efficient, and enables continuous dimming, not possible with traditional lighting controllers. This technology could be demonstrated in multiple locations, installation types, and lighting types in Pullman in facilities that have smart metering installed. Concepts include a greenhouse application in collaboration

with the Smart Farm program to demonstrate savings available through the automated dimming of high intensity discharge lighting in response to changing daylight conditions. Other possibilities could include automated fluorescent light tube dimming, lighting installations at SEL in the manufacturing floor, and office lighting at the Port of Whitman Industrial Park IPZ Incubator.

#### **B. ADVANCED ENERGY STORAGE/RENEWABLE ENERGY SOLUTIONS**

Energy Storage has been identified as a key technology necessary for the successful grid integration of renewable energy sources such as wind and solar. Demand Energy Networks is commercializing a variety of sizes of energy storage systems. It would be very beneficial to quantify their benefits in a commercial environment with a renewable energy installation, using the smart metering in place in Pullman to quantify benefits. The Port of Whitman County installed a solar system that could be coupled to the Demand Energy Networks system and tested on a commercial building. The Port system is currently utilized as back-up power for the IT systems in the building. Additional partners could also include Nolan Heating and Air, installers of Skystream wind turbines, or any of the biomass energy companies to illustrate biomass backup power generation instead of standard diesel generators. The site could be a combination wind/solar/energy storage demonstration site.

#### **C. PLUG-IN ELECTRIC VEHICLE CHARGING**

The Port of Whitman installed two solar powered plug-in electric vehicle charging sites. These could be retrofitted with PNNL controllers to enable the demonstration of smart grid controlled plug in electric vehicle charging. There is an open solicitation for funding of this topic from National Energy Technology Laboratory.

#### **D. BIOFUEL GENERATION/CHP**

WSU has extensive research efforts into various biofuel production initiatives. There are also multiple efforts underway at Infinia to use their Stirling engine with a biofuel burner to demonstrate combined heat and power systems. New start-ups Ag Energy Products, Cataluna, and Best, LLC also all have biofuel generation initiatives underway that could be demonstrated and quantified using the smart grid infrastructure.

#### **E. VAR OPTIMIZATION/DEMAND SIDE CONTROL**

PCS Utilidata has a suite of smart grid technologies for dispatchable demand control and line voltage compensation. Currently there are no demand side control demonstrations planned in the Smart Grid Demonstration. Demand side control is expected to provide significant future opportunities. This could be coupled to concept C, to demonstrate interrupting electric vehicle charging at times of peak demand, in line with the currently open funding solicitation.

### **2. SUSTAINABLE DESIGN**

In the category of Sustainable Design, Energy Efficiency and Green Building opportunities are also identified. This includes opportunity concepts in Energy Efficiency Assessments and Retrofits, Green Building Materials, Design and Operation. Energy efficiency is the first step in the movement towards a clean energy future. Prior to installing more expensive renewable energy systems, most companies will invest in energy efficiency as there is a much larger/faster payback. It does not make sense to install expensive energy production, and then just waste that energy through inefficiencies in the building. There are many new technologies that facilitate greater energy efficiency, and companies like McKinstry are leaders in market implementation. However, the ESCO model requires testing of each new technology to be implemented to create a "Certified Energy Conservation Measure," which has a quantified implementation cost and Return-On-Investment (ROI). Similarly, before architects will begin designing new technologies or incorporating new materials into their green building plans for new construction, the materials and technologies performance and cost must be quantified, and any potential building code issues must

be addressed. In addition, post installation or retrofit, the building must be operated in a "green" fashion, with continuous improvement programs established to further long-term gains. Opportunity concepts in this area include the concepts described below, although many more were identified than could be incorporated in this report. This topic area is rich with candidates for successful commercialization and growth.

#### **A. ENERGY CONSERVATION CERTIFICATION/DEMONSTRATION FACILITY**

The primary concept in this topic area is to create a dedicated facility that enables the testing, certification and demonstration of new energy efficiency technologies in a real-world setting. This will enable energy services companies like McKinstry to begin incorporating them into their design/build and retrofit practices. The concept is similar to the Lighting Lab that was created in partnership with Northwest Energy Efficiency Alliance to demonstrate new lighting technologies. Additional partners would include the group at Pacific Northwest National Lab that operates energy efficiency programs and initiatives on behalf of the Department of Energy, Energy Efficiency and Renewable Energy program office. This group also developed and maintains the Facility Energy Decision System (FEDS) software that was recently licensed by Winfiniti so they can grow their energy efficiency assessment practice targeted towards small and medium businesses. In addition to this, PNNL has initiated efforts into new building code practices that will help smooth the implementation in industry.

#### **B. GREEN BUILDING MATERIALS AND DESIGN**

This topic area is devoted to the development of new green building materials and practices, and facilitating their incorporation into architectural design, and construction practice. The WSU wood lab and other researchers in the ISD are leaders in the development of new building materials that could be commercialized for more sustainable designs in the future. Current efforts include deck boards and structural materials made from combinations of wood fiber and recycled plastic, new epoxy binders made from green, sustainable and less toxic materials, new approaches to siding using durable spray-on concretes, permeable pavements, etc.

#### **C. GREEN BUILDING OPERATIONS**

This concept area is associated with concept 1) and could leverage the same demonstration facility but is more related to the operating practices in green buildings and the development of technologies and automation approaches that combat human behavioral issues. New research at WSU has been initiated around the behavioral problems associated with occupancy of green buildings. When people believe the "building" is solving the environmental and energy problems, they think that their behavior does not matter, and thus form negative habits that result in offsetting the potential gains associated with implementing the green building technologies.

### **3. BIOMASS-ENERGY, BIOMASS-PRODUCT OPPORTUNITIES**

Opportunity concepts in this category entail two primary areas including those related to energy derived from sustainable biomass sources, and Biomass-Products, which are created from sustainable biomass to displace other petroleum based products.

#### **A. BIO-ENERGY CONCEPTS**

According to the DOE report, at: DOE Biofuel Opportunity Report, there will be a cap on conventional biofuel sources, such as Methanol/Ethanol, and a significant gap or shortfall between the mandated federal and state targets, and the currently available supply infrastructure. This paves the way for a large commercialization opportunity for WSU research. A good general resource for bio-energy efforts going on in the State of Washington can be found at: [www.bioenergy.wa.gov](http://www.bioenergy.wa.gov). The primary concept for this category of pursuit is to leverage the research efforts at the WSU Bioproducts, Sciences and Engineering Laboratory (BSEL) and the WSU main campus and combine them with commercialization programs

utilizing related federal funding initiatives from the US Dept. of Energy, and USDA. WSU has recruited STAR researchers in this field and is also focused on developing expertise around Algae based fuels, and catalytic technology that can be used to improve the economics of biofuel production, and the cleanliness of biofuel combustion. New companies, such as GoNano, Cataluna, Best, LLC, and CleanVantage, LLC have all recently formed from WSU research efforts in this field. WSU BSEL could be the topic area lead, and leverage the new facility in Tri-cities, and new research contracts recently received from DOE to turn nearly any agricultural waste into valuable bio-fuels. This is the primary technology that resulted in the formation of Clean-Vantage, LLC. Clean-Vantage, LLC is a spinout from BSEL and is part of the new \$1.5M demonstration program awarded by DOE. Cataluna is also part of the Boeing funded effort to create new sustainable sources of jet fuel from sustainable biomass feedstocks. Infinia is a leader in the development of Stirling engine technology. The company's core product is to utilize this engine in concentrated solar systems for the production of electricity. The company is taking the same engine, and coupling it to biofuel heat sources to produce electricity from biomass for combined heat and power applications. Ag Energy Products is a new start up developing two biofuel products: a Renewable Electrical System (RES) and a Renewable Fuel System (RFS). The RES uses gasified biomass to power an electrical generator. The RFS integrates gasified biomass with a Fischer-Tropsch catalytic system for hydrocarbon production, which is used for producing renewable jet fuel. The Company has completed the fabrication and testing of a full scale proof-of-concept RES unit that is producing 13KW at a Dusty Farm Cooperative test site. The next step is to scale up and automate the system.

## **B. HIGH VALUE SPECIALTY CHEMICALS**

Many products currently produced from petroleum based fuel sources can alternatively be produced from biomass feedstocks. This topic area is related to the commercialization of such approaches based upon WSU research. Ajuga Biosciences is a spinout of WSU based upon the research of Mark Lange, using the mint plant to produce specialty terpene based chemicals and biofuel additives. Biofuel technology supplier, Best, LLC has technologies being commercialized from WSU research in the area of improving efficiencies of Anaerobic Digesters through Nutrient Recovery from digester waste water. They are also innovating in the field of improving Algae based biofuel production through engineering the growth process, and recovering glycerin from the biofuel refinement process to serve as algae feed. Their processes enable the generation of oils high in Omega 3 fatty acids from algae based feedstocks that will have a higher price point than biofuel for combustion applications. Spokane Industries has developed stainless steel processing vessels for the biofuel market that are also being adapted for higher value bioproducts and biochemicals. These systems are essential in the scale-up of batch manufacturing of these high value products. In addition, they are involved in projects to install fuel farms (storage, fueling/defueling, and recycling) for oil and gas companies outside the region.

## **4. SMART FARM/SMART HOME**

The field of applying technology to enhance food security, especially in the area of Urban Agriculture is exploding. Eight of the world's largest foundations, including the Ford Foundation, Bill and Melinda Gates Foundation, The William and Flora Hewlett Foundation, The David and Lucile Packard Foundation, W.K. Kellogg Foundation, The McKnight Foundation, Rockefeller Foundation and The Walton Family Foundation, recently formed an organization called AGree to tackle the world's food issues. The primary concept for this category of pursuit is to leverage the research into new "smart environment" technologies being developed, tested and implemented on the new 17 acre organic smart farm and in the smart home projects at WSU. At the WSU organic smart farm, the students will be developing functional spaces, including living quarters, offices, a commercial kitchen, teaching facilities, and greenhouses that will make the best use of energy while

minimizing water and fertilizer usage. The project will also be working to integrate pest control, plant and animal management. The real-life project will be incorporated with WSU's capital planning. The WSU Smart Farm program is investigating leading edge technologies for sustainable food production. The WSU program will serve as the test bed for later commercialization of the most viable approaches. Several smart farm opportunity concepts are delineated below.

#### **A. ENERGY EFFICIENT LIGHTING AND WATERING DEMONSTRATIONS**

The Smart Farm demonstration program creates a unique opportunity to demonstrate savings available through the automated dimming of high intensity discharge lighting in response to changing daylight conditions. These demonstrations could utilize the Flyback Energy controller, as well as new lighting technologies being tested by Dr. Amit Dhingra that are based upon utilizing LED's that provide light in different spectrum bands that are tuned to specific plant growth stages and requirements. This technology will be more commercially viable as LED costs continue to drop, in tandem with escalating energy costs. Implementation of these approaches could also be key in creating enough energy efficiency gains to enable the viability of renewable energy powered growing systems.

#### **B. ADVANCED ENERGY STORAGE/RENEWABLE ENERGY SOLUTIONS**

The Smart Farm Program is investigating the use of renewable energy for greenhouses. The Infinia CHP system, or other systems from companies such as Ag Energy Products, could be used to heat/power greenhouses as well. With additional catalytic conversion from GoNano, these systems may also function for CO<sub>2</sub> augmentation to enhance plant growth.

#### **C. SMART GROWING MEDIA/GROWTH OPTIMIZATION**

There is growing concern over the sustainability issues surrounding growing media commonly used in greenhouse based food production, and potting soil mixes. Sphagnum peatmoss is "mined" from bogs, and takes as long as 10,000 years to regenerate. Worse, the mining practices entail cutting drainage channels in wetlands and draining the bogs, which not only destroys the land being mined, but adjacent wetlands as well. Replacement products, such as coconut coir are also shipped in from long distances from tropical locations. Vermiculite, another popular growing media is also mined, and then processed at high temperature in energy intensive processes. The EPA has also recently begun studying serious issues associated with Asbestos dust in the media, and banned several products. Perlite is also mined and energy intensive to produce. WSU and area start-up Plantcare Technologies have begun investigations into creating and testing a replacement product made from Douglas fir bark treated with a superheated steam drying approach to drive out waxes and improve nutrient and water retention capability. Growing trials conducted by the WSU organic farm have yielded promising results. Another startup out of WSU, Phytelligence has pioneered processes and engineered an environment that accelerates plant development, helping to ensure health in the first critical months of growth. Commercial growers can experience a higher level of early plant success rate using Phytelligence's methodology and technologies. Phytelligence's first commercial systems will be targeted towards high quality orchard stock to supply nurseries suffering from nearly a 10 year backlog of demand greater than supply. Phytelligence cuts the cycle time from three years to one year, with correspondingly lower input costs, and higher quality, higher yield outputs.

#### **D. URBAN AGRICULTURE SYSTEMS**

With the growing cost of fuel, and increasing concerns over food security, there is a significant push at the federal, state and local level to promote new methods of urban agriculture. The Pullman IPZ tested vertical, dense growing methods using flood and drain hydroponics for the possibility of low impact roof top gardens. In addition, the WSU smart farm program is looking into new aquaponic systems that combine aquaculture with hydroponic agriculture to reduce inputs, and improve food production potential per unit area. These systems are complex, and

difficult to engineer. Once the smart farm program research yields tested prototypes, this technology may be commercialized for food production in dense urban environments.

#### **E. SMART HOME**

The WSU Smart Home program is the brainchild of Professor Diane Cook. Dr. Cook has over \$3M in funding, and is also supporting the Smart Grid efforts. The program is investigating the use of artificial intelligence coupled to sensor networks to automate key functions in the home, possibly resulting improved convenience, safety, energy efficiency, etc. Early target applications include assisted living environments where the smart home technology will reduce assisted living care costs and improve quality of life for patients and enable them to stay in their homes longer.

### **5. RENEWABLE ENERGY**

Opportunities in Renewable Energy in Eastern Washington abound, mostly centered around large scale implantation of wind energy resources. There are significant efforts in several Eastern Region Counties centered around developing curriculum and workforce training for workers needed to service this growing industry. This report does not cover any of those efforts, as many reports are available on the topic. Nor are any of the renewable energy opportunities discussed in previous sections repeated. Instead, smaller, unique applications of renewable energy are discussed.

#### **A. SOLAR POWERED RURAL BROADBAND ACCESS**

The Port of Whitman County/Pullman IPZ was recently awarded a \$8M fiber infrastructure project to improve broadband access in Eastern, WA. The Port has been collaborating with IPZ partners Galexis Technologies and RJR Solar to develop and implement a network of rural broadband access systems using a mesh network of solar powered radio towers. This network has already brought broadband access to many area homes previously lacking any sort of internet service outside of Satellite. With the \$12M fiber expansion, and significant federal funding available to improve rural broadband access, this program could be expanded dramatically.

#### **B. REMOTE SITE POWER APPLICATIONS**

Related to the above effort, many telecom huts will be located along the fiber route, and currently exist in Eastern, WA. Standard practice in such sites is to run grid power to the site, and then also install standard diesel generator or battery backup power systems that keep sites up in the event of power outages. Relion specializes in fuel cell technology targeted towards this market, and the new Infinia CHP system is targeted to similar environments, including remote northern oil/gas industry sites. In building out our telecom infrastructure in Eastern Washington, the appropriate technology of companies in the region could be leveraged to accelerate economic development in this area.

### **OPPORTUNITY PROFILE SUMMARY**

In searching for funding for the opportunity concepts described in this section, the potential funding sources identified by the key topic areas highlighted are illustrated in the table below. Many of the funding sources are applicable to multiple topics, so the real total is less than depicted. Yet, if collaboration is facilitated to leverage the concepts described so that multiple objectives are achieved in one program, our region will be more competitive in our pursuit plans. However, if we fail to implement organization and process, and effectively compete for the funding available, other regions will garner these resources and surpass our regional company's ability to compete nationally and globally. With the limited access to private capital already described, our region cannot afford to let these opportunities slip by.



### Opportunity Concept Available Funding

	Funding Available
Smart Grid	\$570,550,000
Sustainable Design	\$602,630,000
Bioenergy/Biomass Products	\$377,180,000
Smart Farm/Smart Home	\$239,100,000
Renewable Energy	\$701,830,000
<b>Total</b>	<b>\$2,491,290,000</b>

- **Human capital**

The Pullman IPZ has all the human capital needed for a successful zone, including world class Smart Grid researchers like Dr. Anjan Bose, Dr. Dave Baakan, Dr. Carl Hauser and Dr. Chen-Ching Lui, and internationally renowned Smart Grid leader, who is joining WSU as a STARS professor this coming fall. In the area of Smart Farm, Dr. Mike Wolcott and Dr. John Reginald form the core team. In the area of Smart Home, Dr. Diane Cook is a nationally recognized leader, and has multi-million dollar programs underway. In Entrepreneurship, in addition to Zone manager, Dr. Donald Tilton, who teaches Technology Ventures, WSU just recruited, a new director who ran the highly successful Entrepreneurship program at his previous university. These resources are also closely aligned with the entrepreneurship program in the college of business.

- **Infrastructure**

The Pullman IPZ has excellent infrastructure for moving the plan forward, including two business incubators, both with excellent IT and fiber infrastructure and class A lab and office space available to new business start-ups at reasonable or below market rates.

- **Long-term market growth for the technology**

The technologies targeted for IPZ pursuit are all in the early stages of commercialization and have significant global opportunities for growth. The power grid in the US is in need of modernization, and billions are expected to be invested in upgrading to a Smart Grid in the next decade. Of course, the opportunities are global. In the area of Smart Farm, the issues surrounding food security are also a growing global concern. Currently, we just passed the point where more than 50% of the world's population lives in cities, and more than 80% of the food consumed is shipped in from an average of 1,000 to 2,000 miles. The new field of "urban agriculture" and the application of new technology to address environmental concerns or food safety concerns with traditional agricultural practice is the most rapidly growing sector of modern agriculture. It is difficult to estimate the market size and growth for Smart Home, as the technology is an emerging market, but preliminary estimates are in the range of several hundred million annually.

- **Entrepreneurial Climate in Pullman IPZ**

One of the core strengths of the Pullman IPZ is the strong Entrepreneurial Climate in the Zone. The Pullman IPZ Zone administrator also is the instructor of the Technology Ventures class taught in the College of Engineering and Architecture at WSU as part of the Kauffman Award winning Harold Frank Engineering Entrepreneurship Program. There is a strong tie between the Pullman IPZ, including the annual support provided by the Port of Whitman County to the WSU Annual Business Plan Competition and the availability of two technology business incubators in the region. The Small Business Development Centers and the Southeast Economic Development Authority (SEWEDA) are all closely linked, and collaborate on creating new business opportunity in the region.

- **Commercialization plan**

In general, commercialization of technologies developed in the Zone follows one of two paths. 1) New business formation; or 2) licensing and transfer to existing companies. Both of these paths are strong suits in the Pullman IPZ, as the climate is strongly entrepreneurial and the zone had two business incubators. The zone also houses the university technology transfer and licensing function. The role of the IPZ in this process is to help ascertain the most promising technologies, assist in identification of the best commercialization pathway, organize and stimulate collaboration, and provide access to facilities, resources, infrastructure and entrepreneurial guidance.

- **Accomplishments/progress to date**

At the beginning of the IPZ Program, the Pullman IPZ consisted of an empty 40,000 square foot building, and a plan for filling it up based on moving into Green IT. The Green IT initiatives and the initial projects were very successful at stimulating collaboration and attracting activity in the zone. The building is now 50% occupied, and certain IPZ projects have yielded innovation that has gone into commercial development. A few examples of how the Pullman IPZ works are highlighted below.

The Green IT projects attracted Galexis Technologies to move into the incubator space to leverage Port's fiber and the server infrastructure installed. The solar projects, coupled with collaboration in the building and among the partners like the Green IT Alliance and RJR Solar led to the innovative development of a solar powered wireless broadband mesh network coupled to the Port of Whitman's fiber project. Since this project started, Galexis has now fielded 8 towers and is delivering profitable service to more than 120 rural customers, proving out the model. Now, with the \$8M ARRA project with NoaNet, the Port is expanding the fiber network from Clarkston to Spokane, creating a future growth opportunity of nearly tenfold for Galexis to deliver innovative wireless broadband access across multiple Eastern Washington rural counties. This is but one example.

Another example of how Innovation Partnership Zones truly work is in the creation of Ecowell. The IPZ Interpretive Walk Project was used to create an innovative computer kiosk. Simultaneously, the Technology Venture class at WSU, taught by the IPZ administrator resulted in the Ecowell concept. The concept went on to win the WSU Business Plan Competition, and the company was formed. After moving into the incubator, the student interns working on the Green IT initiatives brought those skills into Ecowell and helped develop the vending kiosk. The company has now raised approximately \$1M in private equity investment, fielded 10 kiosks and validated the opportunity, and is in the process of closing a \$5M equity investment and moving to California to begin a larger test market, full production kiosk development, and implement a national expansion program. The downside of this example is that Ecowell was unable to raise equity investment from local sources, and was forced to raise capital from outside the region. This is forcing the company to move, rather than create local opportunity. This example is a primary motivation for the necessity of solving the lack of access to capital in the Zone. While it is not possible to predict the future or prescribe innovation, but the creation of a collaborative environment does work, and yields positive results, often coupled to changes in direction.

- **Plan for measuring and reporting**

The measuring and reporting requirements for IPZ are outlined in the program requirements. The dedicated in-kind port staff support will augment the IPZ administrator's efforts to comply with all measuring and reporting requirements. In addition to the standard reporting, the Pullman IPZ will report on new business formation and new funding awards for IPZ partners. The Zone will also report on progress towards garnering additional resources for administration, the creation of access to capital, or execution against any of the proposed concept projects outlined in preceding sections in the technology areas of interest.