



Oregon Energy Systems, Technology, and Research Alliance
A Charitable Partnership Fund organization

Oregon's Renewable Energy Advantage

Investing in Talent

Creating Family Wage Jobs

Measuring Outcomes

AUTHORS

Charles L. Baldwin
Josh Bratt
Phil Keisling

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EXECUTIVE SUMMARY

Oregon is endowed with an exceptional combination of hydropower, wind, wave, solar, biomass, and geothermal energy resources. Over several decades, the state has earned a national reputation – and acquired an enviable “brand” -- for our renewable energy, conservation, and other “green innovation” policy initiatives. In a June, 2009 report by the Pew Charitable Trust,” Oregon ranked first among 50 U.S. states (as of 2007), with this sector accounting for 1.02% of our overall economy.

Few states are as well-positioned as Oregon for national leadership in creating a significant number of new jobs, entrepreneurial activity, and economic growth in what many now dub the “Clean Energy Economy.” But will Oregon squander its considerable advantages in the years ahead? Will such challenges as a looming \$2.5 billion budget deficit and high unemployment, overwhelm our ability to forge bold, innovative initiatives in this arena? Will other states ultimately prove far more successful in building *their* economic futures on the very same foundations?

OESTRA – the Oregon Energy Systems, Technology, and Research Alliance – has been formed to ensure Oregon can achieve its extraordinary potential for creating new jobs, entrepreneurial activity, and economic growth in the Clean Energy Economy.

OESTRA’s central premise is that to fully capture the economic and environmental benefits inherent in the Clean Energy Sector, Oregon must significantly upgrade and transform its technology talent pool -- especially in applied engineering research and development.

OESTRA proposes a sharply focused, sustained, and relatively modest investment of public dollars – approximately \$4 million a year over 25 years – that, combined with private and Federal support, will allow Oregon to attract and secure true, “world class” talent in 10-12 Clean Energy engineering disciplines. The top-decile students, professors, and researchers who would be part of OESTRA’s “Clean Energy Scholars” program, would be key catalysts for creating the new jobs and business activity that would generate a significant Return on Investment (ROI) for the public dollars committed.

Indeed, OESTRA’s vision includes strong performance and accountability measures. By design, its investment decisions will be subject to a rigorous ROI analysis that includes such key metrics as:

- The increase of R & D dollars attracted to Oregon from federal and private sector sources, including the U.S. Department of Energy;
- The number and size of new companies “spun out” of OESTRA and OUS institutions, and/or created by individuals employed or educated there;
- The number and size of out-of-state companies who create or re-locate headquarters, laboratories, or other operations in Oregon;
- The total number and economic value of Oregon-based jobs that can be directly attributable to these initiatives;
- The increase in tax revenues accruing to state and local government as a direct result of OESTRA investments.

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Examples from other states help define key lessons and “critical success factors” Oregon should heed in moving forward with such an initiative. Chief among them:

- Devise an independent governance model, that collaborates closely with existing research universities and laboratories but has the flexibility to target investments to real and emerging markets, in which private businesses will invest significant resources of their own;
- Focus on Oregon’s existing, well-understood “competitive advantages,” avoiding significant investments in sectors that, while attractive, don’t really leverage local strengths;
- Commit a “critical mass” of sufficient, long-term public investment to give key public and private players confidence in a sustained commitment;
- Recognize the transformational role that first-rate, academic talent plays in building programs, attracting top-tier students, leveraging federal and private R and D dollars, and spawning new business enterprises.

For example, in the early 1980s, the University of Texas funded a number of endowed chairs in computer science as a key part of convincing an industry-led consortium known as the Microelectronics and Computer Technology Corporation (MCC) to locate nearby. MCC became a key catalyst in the growth of the U.S. semi-conductor and software industries, much of which still remains centered in the Austin, Texas area.

The Georgia Research Alliance, a 501 c (3) whose board includes the state’s most prominent business leaders and presidents of the state’s six research universities, includes both an “Eminent Scholar” program and a “Venture Labs” component. The GRA initiative encourages both the pursuit and commercialization of innovative research within a handful of specific academic disciplines relevant to the state’s private companies and major research universities.

Since 1990, Georgia has invested over \$500 million in GRA, with a strong emphasis on biosciences, advanced telecommunications, and software. According to GRA, the effort has brought 61 eminent scholars to Georgia; leveraged \$2.6 billion in federal and private R and D investment, and spawned the creation of 150 new companies and over 5,500 new jobs.

Ohio Third Frontier was put in place in 2003 to support world-class research in industry-aligned platforms, to encourage collaborative research and commercialization activities, and to spur new technology company formation. This is a ten year, \$1.6 billion set of programs that includes traditional state agencies like economic development and employment together with major input from the private sector. A performance review by *Stanford Research Institute* in 2009 claims that, as a result of the Ohio Third Frontier program, the State’s mid-program expenditures of \$681 million generated \$6.6 billion of economic activity, 41,300 jobs, and \$2.4 billion in employee wages and benefits.

Oregon currently has two major programs focused on academic engineering and business innovation. Both have achieved important successes, though both lack the focus and scope of OESTRA’s specific vision.

Since 1997, the state has invested more than \$140 million with the Engineering and Technology Industry Council (ETIC) initiative. ETIC has succeeded in increasing engineering graduates by 30% per year. According to a recent ETIC summary, the university professors and programs funded by ETIC have attracted more than \$100 million in additional private support.

However, ETIC’s mandate includes all engineering programs, of which Clean Energy is just a small component. And even by ETIC’s own calculations, Oregon will still need to import out-of-state-trained engineering graduates during the next decade, as increased demand and retirements outstrip supply.

A second program, Oregon InC, was first funded by the 2005 Legislature. Unlike ETIC, where private sector members sit on an advisory board, Oregon InC. is a private-industry led program with several signature research laboratories governed by independent, non-profit boards.

Two programs in particular -- the Oregon Nanotechnology initiative (ONAMI) and the Oregon Built Environment and Sustainable Technologies (BEST)—hold important Clean Energy components. However, like ETIC, Oregon InC. lacks a dedicated funding source, and includes limited money to attract top-decile students and outstanding academic talent.

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Even amidst a severe budget crisis, the imperatives of economic development and job creation will require the 2011 Legislature to look at meaningful, cost-effective ways to produce and attract the talented engineers, entrepreneurs and skilled workers needed to power Oregon's Clean Energy economy.

OESTRA's relatively modest, \$4 million annual cost could be financed in a number of ways. Possible funding sources – which will be examined in more detail this summer and fall by an OESTRA Advisory Group now being formed – include:

- A one-time appropriation of \$12 million, matched with \$12 million from the private sector. After initially hiring 3-4 top priority faculty, OESTRA's full ramp-up could be financed by interest earnings and directing a specific share of grant proceeds and other realized revenue back to this fund;
- Use of about ¼% of the state's utility-based Public Purpose Charge – whose policy goal is to promote conservation and renewable energy efforts and innovations;
- Apply a small (1-2%) administrative charge on current and future Business and Energy Tax Credit (BETC) recipients, to increase the Oregon-based benefits of these tax expenditures;
- Use revenue from Oregonians' on-going use of "old energy" – e.g., oil or coal - - to help jump-start our transition to renewable energy sources. One possibility: any re-licensing of PGE's Boardman coal facility could dedicate a certain portion of operating revenue towards OESTRA's Clean Energy Scholars Initiative

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The need for greater national security, concerns about global warming, and the rising cost of petroleum are converging to give Oregon an historic opportunity to use its abundant renewable energy resources to promote energy independence sustainability. Notwithstanding Oregon's current economic and budget challenges, there's actually no better time for Oregon's public and private sector leaders to come together to forge a plan that can have a lasting and transformative effect on Oregon's talent pool – and our economic future.

This paper will outline OESTRA's vision in more detail; examine its importance and key implications; and provide relevant models from other states. Most important, it is our sincere hope that this paper will stimulate real action, by empowering a broad coalition of concerned Oregonians to join ranks to make this collective vision a reality.

OREGON'S RENEWABLE ENERGY AND TECHNOLOGY POLICY: PAST INITIATIVES & NEW FRAMEWORKS

As U.S. Senator Ron Wyden recently observed, Oregon's renewable energy bounty is enormous, and diverse:

"...States like Oregon have enormous potential for development of renewable energy - solar, wind, geothermal, biomass, wave and tidal. The challenge is to find new ways to harness these energies. Renewable energy is also not just about fuel that goes into cars or electricity for homes or buildings. Renewable energy can also be used to heat homes and buildings, and power factories and businesses."

One type of renewable energy – hydropower – has already given Oregon a clean energy advantage for decades. In the sparsely populated area along the Columbia River and east of the Cascades wind farms are providing a significant share of renewable energy to Oregon farms and cities. Geothermal hot spots are located throughout the state. Klamath Falls, is working to be the first city in the U.S. to be energy self-reliant on geothermal energy. The Oregon coastline has a deep offshore shelf that favors wave energy. Agricultural, forestry, and municipal waste are ideal for cogeneration. Solar energy is abundant throughout the state.

Many states have one or more of these resources. Oregon has all of them, in abundance.

Over the past 15 years, Oregon has been making sizeable investments in various programs that will attract renewable energy companies, build capacity in higher education, focus on innovation and new technology, and redirect consumption toward renewable energy. Much has been achieved. Four of these efforts, beginning with the oldest, are worth a brief review.

I. Engineering and Technology Innovation Council (ETIC)

In 1997, the Oregon Legislature founded the Engineering and Technology Industry Council (ETIC). Its purpose was to invest State tax revenues in Higher Education to expand Schools of Engineering and bring greater awareness to the field of engineering in primary and secondary schools.

The Legislature envisioned a 10-year program costing \$100 million. The implicit goal was to expand Oregon's engineering work force enough to enable companies to hire locally. State, private sector, and higher education representatives were urged to collaborate with ETIC to achieve its goals.

Much has been achieved by ETIC during the 10 year experiment. Higher education expanded its teaching staffs, attracting private grants for new engineering laboratories, and receiving Federal Grants for engineering research. The State funded the program throughout by allocating a total of \$140 million. However, the most recent ETIC report shows that Oregon continues to have a deficit of engineering graduates and that the gap will widen during the next 5 years.

ETIC also has a very broad focus, across all engineering disciplines. Only a small fraction of its \$140 million in spending since 1997 has gone to "Clean Energy" fields. However, in its current budget request, ETIC targets \$12 million for engineering programs specifically related to clean energy.

II. The Energy Trust of Oregon (ETO)

In 1999 the Legislature passed legislation that resulted in the creation of The Energy Trust of Oregon, an independent nonprofit organization dedicated to helping Oregonians invest in, and benefit from, energy efficiency and clean renewable energy. This program offers cash incentives to residential, commercial, and industrial consumers and is supported by a “Public Purpose Charge” on certain investor owned utilities. (Municipal utilities, PUDs, and other utilities are exempt and do not participate in the program).

The 3% charge, mostly from customers of PGE, PacifiCorp, and NW Natural Gas, generates approximately \$80 - 120 million each year. To facilitate various conservation and renewable energy initiatives, the Public Utility Commission created the Energy Trust as an independent, non-profit organization.. The Trust provides services and incentives to single-family homeowners, multifamily property owners, manufactured home owners, school districts, cities, counties, and businesses of all sizes, serving approximately 7,000 businesses since 2002. Energy Trust also provides no- and low-cost energy-saving tips for renters and the general public.

Other parts of the original law – now incorporated into ORS Chapter 757 – fund weatherization projects for school buildings, and provide assistance to low-income utility customers. To date, the Public Purpose Charge has generated more than \$600 million, and in 2009 the Oregon Legislature extended it until 2026.

III. Oregon Innovation Council (Oregon, INC)

In 2001 the state of Oregon established the Oregon Council for Knowledge and Economic Development (OCKED), which was later merged into the Oregon Innovation Council (Oregon InC), a private sector-led advisory committee. A core component of Oregon, InC. are its three “signature research centers” in biotechnology, renewable energy, and nanotechnology. The signature research centers link various universities and research laboratories with industry assets in Oregon.

The state-supported Oregon Nanoscience and Microtechnologies Institute (ONAMI) advances the state’s nanotechnology economy through close public-private partnerships. One unique feature is a facility sharing agreement through which any member of ONAMI can use facilities such as the University of Oregon’s Center for Advanced Materials, which includes five separate labs. ONAMI is overseen by a separate, 501 c (3) board that includes both industry leaders and public officials (including several legislators). A similar model exists for the Built Environment and Sustainable Technologies effort (BEST), which focuses on “green building” design and research.

Since 2005 Oregon Inc. has received between \$45 million in lottery dollars. According to Oregon InC. officials, these expenditures have resulted in more than \$190 million in Federal R&D grants for various activities. Oregon IncC’s single largest recipient has been ONAMI, whose efforts have included a “Signature Faculty Fellows” program aimed at attracting world-class researchers to Oregon.

IV. Business Energy Tax Credit (BETC)

In 2006 the Governor requested that an appointed panel work with the Oregon Department of Energy to examine renewable energy policy in Oregon and make recommendations for improvement. The panel’s work –which was published as the Oregon Renewable Energy

Action Plan (REAP) -- was designed to build on a number of key policies and benchmarks that Oregon had already achieved. From the report:

..."Oregon has long been one of the nation's leaders in encouraging renewable energy resources. For example, the state provides tax credits and low-interest loans for all types of renewable resource projects through the Oregon Department of Energy. The Energy Trust of Oregon uses public purpose charge funds from Portland General Electric (PGE) and Pacific Power customers to achieve a goal of renewable sources supplying 10 percent of the state's electric power by 2012. Many utilities in the state offer consumers "green power" options to support development of renewable resources. PGE ranks second in the country in sales for green power options; PacifiCorp ranks fourth. More than one million Oregon households and businesses regularly receive information on the power sources, environmental impacts and costs of generation from renewable energy sources versus fossil fuels. The Bonneville Power Administration (BPA) and the consumer owned utilities offer renewable incentives through the Conservation and Renewable Discount program. The Oregon University System, with utility funding, has done solar and wind resource assessment for decades, with all data publicly available."

Building on this foundation, REAP recommended a number of key policy changes that soon became law. One was the creation of Renewable Portfolio Standards, passed by the 2007 Legislature, mandating that utilities provide a set percentage of electricity from defined, renewable energy sources such as wind, solar, and geothermal. Investor owned utilities such as PGE and PacifiCorp were required to achieve a 10% benchmark by 2015, and a 25% mark by 2025.

Of even more importance was the issuance, in 2007, of new administrative rules by the Oregon Department of Energy that governed the "pass-through" rate for the states's long-standing Business Energy Tax Credit (BETC). The new rates were designed to provide more capital and incentives to owners of defined renewable energy projects. Other parts of the BETC program were targeted to attract manufacturing and associated jobs to Oregon, such as the Solar World manufacturing plant that opened in Hillsboro in 2008.

Under the BETC program, a state income tax credit is awarded to businesses, nonprofits, and other organizations when they invest money in qualified projects intended to reduce energy consumption. If a business has no tax obligation, it can sell its credits to another business to help reduce the buyer's tax obligation.

These "pass through" credits became especially attractive after the 2007 rule changes. For projects authorized between 2000 and 2009, the potential value of approved BETC credits -- that translates into lost state corporate income tax revenue -- is estimated to exceed \$1.3 billion. Two thirds of these credits came after the 2007 change in the BETC pass-through rules.

During the Oregon Legislature's February 2010 special session, BETC underwent significant change. New financial limits are now in place and the statutes give more discretion to the Director of the Oregon Department of Energy ("ODOE") to reject BETC applications and to reduce the amount of BETC tax benefits delivered to projects. Even so, the new changes still authorize another \$600 million in BETC tax credits, through 2012.

Only a small proportion of the \$200 million appropriated directly to ETIC and Oregon InC. since 1997 has been allocated to clean energy. Instead, Oregon has relied heavily on traditional tax policies to promote economic development in the clean energy sector. While the merits and effectiveness of BETC in particular have been the subject of much current debate, the combined commitments and expenditures from these BETC and ETO --nearly \$2 billion over the last decade -- have clearly had significant impact on economic development in Oregon.

However, a broad consensus is developing in Oregon (and other states) around the importance of moving beyond traditional tax and subsidy programs, especially in the face of huge budget shortfalls. (Indeed, some have even called for BETC's outright abolition by the 2011 legislature). Economic development experts and policy makers are increasingly focusing on "talent based" initiatives, including the commitment of government to research and development; the creation of pools of highly trained labor; and proximity to top tier university programs.

Until recently, Oregon state government and its Higher Education system remained largely unseen with regard to technology-based economic development. Market-defining technology giants such as Tektronix (beginning in the 1950s) and then Intel (1980s) established their own training facilities to develop a skilled labor force. Private sector leaders had few, high-level interactions with the OUS system; indeed, leaders from Tektronix and other private businesses pooled their resources in the early 1960s to create a private, graduate-education only institution, the Oregon Graduate Institute (OGI).

When Intel eclipsed Tektronix in the 1980s as Oregon's premier technology employer, the pattern largely continued. A large portion of the "Silicon Forest's" talent pool continued to come from graduates trained outside Oregon, or from private sector investments or sources (including OGI).

This approach largely worked -- though only to a point. Intel grew dramatically through the 1990s, even without significant OUS presence in its vicinity. By the mid 1990s, the "geographic mismatch" was becoming quite evident between Oregon's existing engineering programs at OSU, UO (and to a lesser extent, at OIT) and its burgeoning technology sector in the Portland metropolitan area (including a few, embryonic "Clean Energy" firms). Indeed, a driving force behind the 1997 passage of ETIC was to fund new programs that would include non-OUS entities (like OGI) to be more responsive to these market demands.

These patterns are described in fuller detail in a study published 2005 by Heike Mayer and Joe Cortright for the Metropolitan Policy Program at Brookings Institute. The report also matches recommendations made in a widely read 2007 report by the Pew Research Foundation regarding the need for a technology talent pool to foster economic development.

As Mayer and Cortright observed, in a section entitled "The Roles of Public Policy and Higher Education:

Corporate assets rather than public policy or government-led economic development created the Silicon forest. Tektronix and Intel led the growth of the Silicon forest. Public policy was reactive to the growth of high technology industry. State and local government, for example, reacted to pressure from Intel to grant tax breaks on large capital investments.

Tektronix and Intel managed to compensate for the Portland area's lack of a world-class research university. Both companies invested heavily in in-house education. Both also lobbied heavily for improvements in the higher education infrastructure. State policymakers, however, only recently realized the importance of investments in higher education."

Put another way, talent-focused initiatives such as ETIC and Oregon InC. have been relative newcomers to the scene. In contrast, other states took such steps a decade or two earlier – and even more aggressively.

For example, while much of Oregon's economic development investment policy during the last 20 years has focused on recruiting new companies via tax incentives, states like Texas and North Carolina invested heavily in academic infrastructure to attract the likes of Microelectronics Computer Consortium (MCC) or Semiconductor Technology and Enterprise Corporation (SEMAIEC). Core elements to these programs were features such as endowed university chairs, new technology labs, innovation centers and access to talent pools. These are becoming the primary incentives needed to form growth clusters in the new technology-based economic development models, in addition to the traditional bricks and-mortar incentive packages for site improvements, road access, and tax abatements.

This lesson is now relevant as Oregon contemplates how best to leverage its relative (though highly perishable) "head start" in the Clean Energy economy. Top scientists, students, researchers, and technology entrepreneurs have choices about where to live, receive advanced training, and pursue professional careers and opportunities. Many studies also reveal that talented people with ambitious dreams often prefer to live in areas where public policy aspirations match their personal aspirations.

RENEWABLE ENERGY AND TECHNOLOGY – AN OPPORTUNITY

Because of the size of the energy sector and the scale of transformation needed, renewable energy is one of the few areas of the economy capable of serving as a major new engine of economic growth. By 2030, overall demand for energy in the U.S. is expected to increase by more than 11.5 percent, with electricity demand expected to rise 24 percent. Growth will be even more striking globally, with demand expected to grow by 50% by 2030.

The Breakthrough Institute, in a study entitled “The Third Way Clean Energy Initiative” by Freed, Zevin, and Jenkins, shows that neither the public nor private sectors in the United States are currently investing the necessary resources to ensure our renewable energy leadership and future for the 21st century. Their study, which covers the period 1970 through 2009, shows that energy research has actually undergone a long period of decline. – notwithstanding the near-universal concern (heightened, yet again, by the Deepwater Horizon catastrophe) that the U.S. is dangerously dependent on oil, coal, and other high-carbon energy sources.

Most experts from around the world now agree that a vital component to ensuring innovation in newly emerging sectors such as Clean Energy is a strong, well coordinated, and well financed government R&D strategy. Yet even as recently as Fiscal Year 2009, the total U.S. Department of Energy funding for energy R & D was only about \$5 billion.

Fortunately, this is quickly changing – which underscores even more forcefully the importance of Oregon focusing on a talent-based strategy within the Clean Energy Sector.

For example, the Obama Administration has already begun a process of rapidly expanding government spending on energy R&D, and is projecting a sustained increase in clean energy technology research and development, that could bring overall federal investments to \$35 billion annually. This is in line with the findings of many leading energy research experts. John Holdren, Director of the White House office of Science and Technology Policy, estimates the need for energy research at up to 10 times the current level. Two of the country’s leading energy innovation experts, Professors Gregory Nemet and Daniel Kammen, have called for at least \$17 billion annually in energy research. The Brookings institution has recommended that the U.S. needs to spend at least \$20 billion per year.

In the context of a dramatic increase in Federal research and development funding, The Pew Charitable Trust, in a June 2009 publication entitled *“The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America”* made a forceful case for how states can use the energy crisis to establish economic development models for future growth.

The Pew report states that the Clean Energy economy is being driven by the need for greater energy independence and the need for a smaller carbon footprint. The demand for fossil fuels in emerging economies is already bringing about a rise in the cost of carbon fuels, making the cost of renewable energy alternatives attractive to consumers worldwide. For the past several years the race has been intense to fund research that will develop the technologies necessary to exploit renewable energy resources. These efforts mean new enterprise, economic development, and an expanding employment base for states that are making renewable energy and technology a centerpiece in their science and technology planning.

Pew estimates that by 2007, 68,203 businesses in the United States had generated more than 770,000 jobs in the Clean Energy economy. Just between 2006 and 2008 alone about \$12.6 billion of venture capital investments was directed toward clean technology businesses in 40 states and the District of Columbia.

As the Pew study makes abundantly clear, the Clean Energy economy is an emerging source of jobs that achieve the double bottom line of economic growth and environmental sustainability. In a Congressional climate where budget “earmarks” are disappearing, it is reasonable to anticipate many of these grants will be awarded on a competitive basis.

For a state that in recent years has been significantly “out-earmarked” by its rivals – none of our delegation sits on an Energy-related appropriations committee (CK) -- this is actually good news. If an increasing portion, of a vastly expanded federal energy R and D budget, will be awarded according to “merit,” Oregon is relatively well positioned.

As noted earlier, Oregon offers a diverse, “natural laboratory” unequalled by few other states, with a wide range of renewable resources in one place: hydro, solar, wind, wave, geothermal, and cogeneration. The state is already ahead of the curve, with the highest portion of employment in the U.S. (as of 2007) attributable to the Clean Energy Economy. Then there are the intangible factors, such as our long-established “brand” for encouraging and embracing sustainability initiatives that run the gamut from LEED-certified green buildings and innovative conservation strategies to our nascent leadership in Electric Vehicle deployment.

What’s lacking? Put bluntly, the necessary leadership and programs to build a strong talent pool that can further support and build on these advantages. To successfully compete for federal grants and capture investment for applied research, Oregon must develop a strategy for improving higher education, investing in academic and research leadership, and assisting with the development and commercialization of intellectual property. Failure to do so will mean that federal investments will go to those states that build the best talent.

Just as one telling example: in April 2010, the Department of Energy awarded 37 grants to recipients in 17 different states. The grants were given to a wide range of innovative, renewable energy generation, storage, and transmission technologies.

While University-based researchers were winners in the majority of the grants, none were from Oregon. In fact the authors do not know how many applications, if any, came from Oregon institutions. One company – ReVolt Technologies, a pioneer in zinc battery technology – did receive \$5 million and listed an Oregon address in its application. However, the research team for the Switzerland-based company all work in Europe; at the time of the grant, no full-time employees worked in Oregon.

BEST PRACTICES FOR STATE LEADERSHIP AND PUBLIC/PRIVATE INVESTMENTS

A sampling of articles in the business section of any publication will report that a deep pool of management skills in the labor market is a key attraction when technology companies decide to locate or expand their business. In the renewable energy field this means highly trained engineers, research and development programs, and a milieu of talent that leads to investment and innovation. This is true, in large part, because ideas and innovation are the most precious currency in growth economies.

In 2008 The Pew Charitable Trust and the National Governors Association published a report entitled "*Investing In America.*" The report identifies policies that states can adopt to enable sustainable economic development based on investments that have targeted outcomes. The report makes a strong case for states to create their own research and development (R&D) funds to promote cutting-edge research, build new research institutions, and gain new talent.

The 2008 Pew study examined leading states that are doing more than simply positioning themselves to fare well in competitive grant competitions for federal R and D funds. These states are going a step further, investing in collaborative initiatives to partner with business and higher education—so that corporations will stay securely rooted in their own backyards instead of looking abroad for future expansion. The report also encouraged Governors to work with business leaders, academic researchers, and others to build R&D strengths and create a collaborative culture to drive innovation and economic growth.

The following excerpts from the study are relevant:

The pressure on the 50 states to attract jobs, money and a talented workforce has been building for decades. It's now singularly intense. Huge new overseas competitors like China and India are competing for the same pools of cash and people as Oregon, California, Indiana and the rest. Moreover, some international players like Singapore, Finland and Ireland are demonstrating remarkable prowess at strategically planning for economic growth. Meanwhile, the speed with which innovation spreads makes no competitive lead secure.

As a result, today states must accelerate their efforts or risk becoming economic backwaters. Specifically, they must become places where new ideas are discovered, invented or given their first big break....

...When it comes to funding R&D, states are the newest players in the game, and the smallest. But while the actual money available from states is dwarfed by that offered by industry and the federal government, states have the capacity to influence the future in a dramatic fashion. Industry tends to fund narrowly, and federal investments have plummeted as a share of total R&D. Of particular significance to governors, their staffs and other stakeholders: states' direct involvement in R&D can spur innovations that serve specific economic and social needs within their own borders.

...The biggest lesson learned is straightforward: How much a state spends on R&D is secondary. How it is spent is absolutely critical. Key to this truth is the notion that R&D efforts must be considered investments, not expenditures. Just like any investors, states must begin by carving out areas where returns are tangible and commensurate with risks taken. Not only do the benefits include building talent and high-paying jobs in the state, but they also can be seen in solutions to pressing social problems, improved business efficiency and productivity, and success in global markets....

...Successful states get to these results with steps that are uniquely in the hands of governors, legislators and other policy makers. These include:

- Encourage, even mandate, collaboration among universities, the private sector, and other institutions;
- Put world-class professionals, not political pals, in key positions;
- Create an organization and consistent funding source that facilitates a continuity in R&D partnering and spending; and hold the recipients of public investments accountable for delivering on promised benefits

OESTRA's own research to date has further underscored the importance of these "critical success components" when it comes to state efforts. We believe the following are perhaps the most important lessons:

- Build meaningful private sector/public sector partnerships, so that investments target real and emerging markets, in which private businesses will invest significant resources of their own;
- Focus on existing, well-understood "competitive advantages" – and avoid significant investments in sectors that, while attractive, don't really leverage local strengths;
- Commit a "critical mass" of sufficient, long-term public/private investment, that gives key public and private players confidence in a sustained commitment;
- Establish an independent governance system that targets investments and measures outcomes;
- Recognize the key role that first-rate, academic talent plays in building programs, attracting top-tier students, leveraging federal and private R and D dollars, and spawning new business enterprises.

For example, in the early 1980s, the University of Texas funded a number of endowed chairs in computer science as a key part of convincing an industry-led consortium known as the Microelectronics and Computer Technology Corporation (MCC) to locate nearby. MCC became a key catalyst in the growth of the U.S. semi-conductor and software industries, much of which still remains centered in the Austin, Texas area.

The Georgia Research Alliance is guided by a non-profit private charitable corporation whose board includes the state's most prominent business leaders. Its charter provides that the presidents of the state's six research universities (public and private) sit on the board. The Alliance seeks to bring "Eminent Scholars" to Georgia who can attract applied research investments from the private sector, add Federal research funding, and attract companies that want to cluster around expertise that will encourage the commercialization of relevant research.

Since 1990, Georgia has invested over \$500 million in GRA, with a strong emphasis on biosciences, advanced telecommunications, and software. According to GRA, the effort has brought 61 eminent scholars to Georgia; leveraged \$2.6 billion in federal and private R and D investment, and spawned the creation of 150 new companies and over 5,500 new jobs.

In 2002 Ohio funded the “Third Frontier Program” based on the Georgia approach. By 2009 Ohio had invested almost \$700 million. According to an independent ROI study by Stanford Research Institute (SRI), those funds had resulted in the creation of 9,519 jobs directly and 45,464 indirectly. Meanwhile, venture-capital investment in Ohio grew by 13.2% each year from 2004 to 2008, more than double the national average. A key element of the Ohio program is support for small business innovation.

That same SRI study of the Third Frontier Program in Ohio estimates the state is receiving a 22% return on its investment. This year (2010) voters in Ohio passed an additional \$700 million bond issue to support expanding the Third Frontier Program, bringing Ohio’s total commitment to the program to almost \$1.6 billion.

As outlined earlier, since 1997 Oregon has invested more than \$140 million in the Engineering and Technology Industry Council (ETIC) initiative with the goal of increasing the training and number of engineering students at OUS institutions.

A second initiative, Oregon InC., received about \$45 million since 2005. Those monies have funded several signature research components, including the Oregon NanoTechnology initiative (ONAMI), a wave technology laboratory at OSU, and the Oregon Built Environment and Sustainable Technologies (BEST). Consistent with a number of “best practices” urged by the 2009 Pew Study and others, Oregon InC. to date has focused on about a half dozen major industry clusters, and requires contracts and quarterly reports for specific outcomes from its recipients.

GOING FORWARD - THE OESTRA PROPOSAL

OESTRA – Oregon Energy Systems, Technology, and Research Alliance – has been formed to ensure Oregon can achieve its extraordinary economic potential in the renewable energy sector. It is an economic growth model with long-term implications centered on the transformative power of talent – and specifically, enhancing Oregon’s ability to create, attract, retain, and grow world-class expertise within a wide range of innovative energy disciplines.

OESTRA, by design, is narrowly focused, “zeroing in” on renewable energy research and development. Oregon has truly remarkable – if not unique – strengths in this arena that could be leveraged dramatically with even a relatively modest amount of public investment.

Where might that public investment be focused? We specifically propose an **“Oregon Clean Energy Eminent Scholars”** initiative that creates a network of endowed chairs, student scholarships, and private/public research laboratories. It would be comforting to think Oregon need only nurture its home-grown talent. This may be part of any well designed economic development program, but the reality is that Oregon needs to raise the bar and compete for (and secure) the best talent available from other states or even countries if we expect to remain competitive in today’s economy.

One key component is to attract the nation’s best students in these Clean Energy engineering disciplines. First and foremost, this means targeting those exceptional students now graduating from Oregon high schools, who today feel they have little choice but to go out of state to pursue their nascent careers.

It also means reaching to students across the U.S., if not the world, targeting the “top decile” of talent wherever possible. Important ways to accomplish this goal include scholarships, prestigious summer research opportunities (even, and especially for, those Oregon-educated students who leave to attend institutions such as MIT, Harvard, or U California at Berkeley), and doctorate or even post-graduate opportunities.

An Oregon “Clean Energy Eminent Scholars” program would particularly target the academic talent necessary to attract (and then keep) these top-decile students. As the attached exhibit reflects, the main focus would be hiring up to 10-12 world-class professors in a broad range of Clean Energy-related disciplines. The aim of this investment is twofold:

1. To significantly and rapidly increase the quality and number of engineering programs and graduates in these and related fields, especially within Oregon University System (OUS) institutions. OESTRA’s role would be to fund premiere “opportunity scholars” in targeted fields, assist with developing applied research laboratories, and provide undergraduate scholarships to attract top decile students.
2. Attract significant -- and measurable -- research funding to these disciplines within OUS.

To fund OESTRA's vision for a "Clean Energy Eminent Scholars" initiative of this scale – 10-12 professors, generous student scholarships, and research laboratories -- would require a public expenditure of just \$4.0 million/year.

What's key is not the amount of money – but its certainty. To be competitive at the upper end of the talent pool requires Oregon demonstrate its ability to pay competitive salaries today –and then sustain such an effort over a long-period of time, protected from the frequent vagaries of academic funding cycles and state politics.

Several possible funding mechanisms have already been suggested and are under active review. It's also possible that new ideas, not listed here, could prove more attractive or viable. The current ideas include the following:

- Endow the program with a one-time grant of \$12 million that requires a match of \$12 million from the private sector to create an investment fund of \$24 million. Create endowed chairs and establish a policy that returns a share of federal grant funding to the investment fund for future investment. This approach would give the program at least a 15 year life without additional state investment—and likely a good deal longer, even assuming a modest amount of revenue generated by Oregon's Eminent Scholars;
- Bond the program and establish a levy (e.g. a ½% administrative fee) on those companies that have already benefitted from BETC to retire the bond;
- Utilize approximately 1/4 of 1% of the Public Purpose Charge – about 8% of the total – to fund OESTRA ;
- Use revenue from the on-going use of "old energy" – e.g, oil or coal reliant energy use or generation – to help pave the way to a new energy future. For example, extending the license of the Boardman coal facility under certain conditions, that includes the dedication of a certain portion of operating revenue towards the Clean Energy Scholars Initiative, would use Oregon's "old energy" economy to jump-start this unprecedented effort to reap the economic and environmental benefits of renewable energy.

MEASURING GENUINE RETURN ON INVESTMENT (ROI)

From its inception, a key component of OESTRA's vision has been the central importance of the "Return on Investment" (ROI) perspective. We believe it's important that any public expenditure made in the name of economic development, be subject to rigorous ROI analysis. This means, first and foremost, subjecting OESTRA to such a test.

Even when states do everything right with funding academic research and development efforts, it can be a long while before the scientists who receive funding can point to an actual product that had its genesis in their work. Immediate job creation is unlikely -- and even the most successful research can take 10 to 20 years to bear economic fruit.

It's important to recognize, however, that this is no different from the time span required in exclusively private-sector enterprises. For example, it takes at least 15 years for most new drugs to move from discovery to patent.

Too often, states (including Oregon) have poured public money into investments that have strong constituencies and compelling narratives -- but no real framework for demonstrating whether the promised benefits actually occur. Faith and reassurances from the parties involved is no substitute for rigorous analysis and performance review.

This is why the OESTRA initiative calls for regularly measuring the results of its investments—ideally along a continuum. At the outset of the process, it would make sense to measure short-term results, such as scientific papers published, grants awarded and partnerships seeded.

Somewhat further along, the focus can shift to more tangible results, like higher-paying jobs, new industries and innovation outputs.

Measuring the performance of R&D funds is not a refined science by any means. But an effort needs to be made. Fortunately, there are some relatively universal keys to measuring success in R&D investments:

- Make sure that basic needs are being measured;
- Measure indirect as well as direct benefits;
- Make the measures public—transparency is critical;
- Secure participation from all stakeholders when deciding what to measure;
- Be timely.

OESTRA's testable premise is that a relatively modest, focused, and sustained investment through a public and private partnership in these academic disciplines is a key catalyst for success, and will generate a significant Return on Investment (ROI). Such an ROI would be measured through such key indicators as:

- The increase of Research and Development dollars attracted to Oregon from federal and private sector sources;
- The number and size of out-of-state companies who create or re-locate headquarters, laboratories, or other operations in Oregon;
- The number and significance of patents in these fields, awarded to OUS-trained individuals and entities;
- The number and size of new companies "spun out" of OUS institutions, and/or created by individuals employed or educated there;
- The total number and economic value of Oregon-based jobs that can be directly attributable to these initiatives;
- The increase in tax base accruing state and local government;
- Measure against a baseline of doing nothing.

APPENDIX

HISTORY OF THE OESTRA PROPOSAL

For the past several years, a small group of public-minded citizens has been meeting informally to develop and refine the OESTRA initiative. These efforts include: identifying and meeting with key stakeholders in order to better understand Oregon's existing programs in both renewable energy and academic excellence.

The timing for this OESTRA effort now seems especially opportune. The nation finds itself in a new paradigm of world competition for ways to deal with carbon impacts on climate, national security, and economic sustainability. Oregon is just one of many states competing for universities, industries, and development models that will make us competitive for development and economic sustainability based on new technologies and renewable resources.

That said, Oregon is also uniquely blessed with an abundance of wind, solar, wave, geothermal, hydro, and fiber resources that supports a policy of development and scientific research in the renewable energy field. Accordingly, in early 2010 OESTRA raised \$40,000 in private investment funds to accelerate its efforts, to include dozens of conversations with key public and private sector leaders in Oregon.

A second step in validating the OESTRA approach has been to conduct a study of programs that other states have adopted to develop a technology-based economic development policy emphasizing talent clusters that attract research and development. Texas, Georgia, and Ohio seem to be the most successful. However, many other states have programs and funding mechanisms that are appealing in an economy where state funding is difficult.

An OESTRA Advisory Committee of 10-15 members, roughly split between leaders of the private and public sectors, will meet soon to review work in progress and discuss proposed legislation for the 2011 Legislative Session. We are also polling legislative leaders, the Congressional delegation, selected higher education leaders, leaders of key federal agencies, and private sector leadership. The purpose of this work is to determine the best policies to significantly accelerate Oregon's talent pool of entrepreneurs, engineers, scientists, and skilled workforce. Additional consideration is being given to the creation of applied research laboratories.

After careful assessment by several members of the Oregon Legislature, the OESTRA staff has been asked to help outline issues and prepare legislation for the 2011 Legislative Session. Such legislation would include a proposed framework/governance model; the identification of one or more viable, potential new funding mechanisms; and specific, ROI-based measurements for evaluating the success of any new program.

BACKGROUND OF THE OESTRA RESEARCH TEAM

Charles Baldwin: Charles' professional accomplishments and experience are centered in economic analysis, public policy development, crafting and enacting legislation, and education.

He has been active in public policy development since the 1960's when he was hired as a consultant to help resolve a long-standing dispute between California and the City of Long Beach over development of the offshore East Wilmington Oil Field. He worked with legislative leaders to design and implement statutes enabling field development to proceed. The measure established environmental safeguards, designed an economic model to measure field valuation, set standards for maximum field recovery, and implemented a bidding procedure which resulted in \$100 billion in revenues to support higher education capital outlay.

As Principal Consultant to the California Senate Governmental Efficiency Committee, he was responsible for evaluation of all major legislation assigned to the Senate with a particular focus on program and financial impact. Charles pioneered subcommittee and select committee models for dealing with complex and specialized legislation and published reports on Welfare Reform, Natural Resource Management, Judicial Retirement Policy, Public Employee Collective Bargaining, Public Lotteries, and Alcoholic Beverage Control. Additional consulting roles to the California legislature included preparing the first comprehensive study of tide and submerged lands along California's 1,000-mile coastline wherein he was instrumental in establishing legislative policy for consistent management of tideland grants to local government. Charles also conducted the first comprehensive study of geothermal energy in California and established standards for development of geothermal resources in the state. In that role he served on the task force to organize the first United Nations Conference on Geothermal Resources in San Francisco. Charles public service includes his role as Aide to California Governor Edmund G. Brown, Jr., Director of the Office For Volunteerism, Member of the Council for Humanities, and Member of the Disabilities Employment Council.

A veteran of the Korean War, Charles holds both a B.A. and M.A. in Economics from UCLA where he was a CORO Foundation Fellow and was bestowed faculty approval for continuing with the Doctoral Program in Economics. He and his wife Jeanne live in Silverton, Oregon where they raise chickens, collect rainwater, and grow biodynamic fruits and vegetables.

Josh Bratt: For the past 19 years, Josh has served multiple roles with Morgan Stanley & Company's Global Wealth Management Group (now Morgan Stanley Smith Barney) including; Regional Vice President, Senior Investment Management Consultant, Wealth Advisor, and Portfolio Manager. In his role as Regional Vice President, Josh was responsible for growing revenue and increasing profitability for fourteen offices in five western states. Prior to joining Morgan Stanley, Josh served as a credit administrator, lead financial analyst, and commercial loan officer with a major west coast bank. Josh is a Certified Investment Management Analyst (CIMA), holds a bachelor's degree in economics (cum laude) from the University of Utah, and is a graduate of the Northwest Intermediate Commercial Lending School. His community involvements include board memberships for schools, arts organizations, museums, credit institutions, and organized sports. He has also served as a gubernatorial appointee to the Oregon Energy Policy Review Committee.

Josh and his wife Wendie Kellington reside in Lake Oswego, Oregon where Wendie practices as an attorney. They have two grown children.

Phil Keisling: Phil brings to OESTRA extensive background as a senior executive in both the private and public sectors, and experience as a professional investigative journalist.

From 2000 through 2009, Keisling was an executive with CorSource Technology Group, a Beaverton, Oregon-based information technology and software development services company. His roles there included Executive Vice President for Business Development; VP and General Manager of a \$10 million business unit (“ProDX”), and VP of Corporate Sales and Marketing.

During a 15-year stint in Oregon government, Keisling served as chief policy assistant to then-House Speaker Vera Katz (1985-88). He was subsequently elected twice to the Oregon House of Representatives from a seat encompassing SE and SW Portland (1988-1990).

In 1991, he was appointed as Oregon Secretary of State, then elected in 1992 and re-elected in 1996. As Secretary of State he spearheaded legislation to make Oregon the nation’s first (and still only) state to hold all elections by mail; significantly expanded performance auditing of government programs; and implemented a wide range of management reforms to make his 200-person agency leaner, less costly, and more productive.

Phil’s career as a journalist from 1978-1985 included serving as an award winning investigative reporter with Willamette Week, and an editor of the Washington Monthly magazine in Washington D.C. His work has also appeared in the New York Times, the Washington Post, the New Republic, and Reader’s Digest.

Keisling is a graduate of Beaverton’s Sunset High School and received a B.A. in American Studies from Yale in 1977. He and his wife, Pam Wiley, live in SE Portland. They have a son who is a freshman at St. Olaf College in Minnesota and daughter who is a junior at Portland’s Cleveland High School.

READING LIST OF BACKGROUND MATERIALS

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A SAMPLING OF WHAT OTHER STATES ARE DOING (A partial list)

Arizona. In 2000 Arizona increased its sales tax and set aside the revenues to improve education through 2020. \$69 million is being used for the Biodesign Institute at Arizona State University. The Biodesign Institute combines in one place the university's biomedicine, biotechnology, nanotechnology, information technology, materials science and engineering research programs.

The Arizona Economic Resource Organization (AERO), a 501(c)(6) corporation, was created by Governor Napolitano in 2007 to provide policy direction to several economic groups, including the Arizona Department of Commerce. The Board, which was initially chaired by Governor Napolitano, is made up of leaders from colleges, universities, economic development entities, and business interests. The Board has no formal affiliation to the Department, other than that of an advisory role. The creation of AERO was an attempt to provide collaborative public-private direction to the Department, and to align all economic development resources in the state. There was also recognition that the Department was not equipped to create economic development policy to support a broader statewide vision and plan.

California. It's not unusual for California to be a pioneer. In its efforts to fund R&D, it was one of the first states to recognize that the nature of innovation had changed dramatically, and that it needed to facilitate open, collaborative and multidisciplinary approaches and encourage normally competitive universities to work together.

Much of the recent publicity for California's R&D funding has gone to its \$3 billion, 10-year stem cell research initiative. But that effort is only one of many that California has advanced to bring together public/private sector partners. With a dedication to spending big money for mega-centers, as opposed to spreading droplets of cash across hundreds of efforts, the state in 2000 cobbled together more than \$1.2 billion of capital for four California Institutes for Science and Innovation. California put up \$400 million; private companies contributed much of the rest.

The Bay Area Science and Innovation Consortium (BASIC) is a collaboration of the Silicon Valley region's major research universities (Stanford, UC Berkeley, etc.), businesses (IBM, Genencor, Hewlett-Packard, etc.) and national labs (Lawrence Livermore, NASA Ames, Sandia, etc.) designed to take advantage of unique R&D capabilities to provide solutions for critical national and regional challenges. BASIC has standing teams dedicated to action on advocacy, intellectual property, marketing and communication, and R&D collaboration.

Connecticut. Connecticut's Clean Energy Fund (a unit of Connecticut Innovations, Inc.), the state's Yankee Ingenuity Technology Competition requires that qualified university researchers apply jointly with eligible businesses and show a "substantial" partnership. Funding in 2007 (\$650,000) was focused on proposals addressing commercialization of fuel cell, solar, wind and wave technologies. Business match requirements include:

Large Businesses

Small Businesses

Match of State Funds Required 100%

Varies; a "substantial contribution" is necessary

Cash or In-Kind

At least 50% in cash, remainder in-kind

At least 25% in cash, remainder in-kind

Link firms together, sometimes to consider how to apply technologies to their work.

Serve as problem solvers, offering research and consulting support.

Florida. The State of Florida created two new economic development agencies – the Governor's Office of Tourism, Trade and Economic, Development (OTTED) and Enterprise Florida, a public-private partnership that acts as the state's leading statewide economic development agency. Enterprise Florida contracts with the Governor's Office to perform its role with specific performance requirements in place. Enterprise Florida is a nonprofit, public-private corporation with approximately 10% of its funding coming from the private sector. Enterprise Florida's Board Directors is made up of 62 business, government, and community leaders. All appointees are subject to Senate confirmation. The Governor is the Chairman of the Board and the Vice Chairman is an elected private sector leader. OTTED oversees the state's public private economic development and tourism partnerships and also manages the state's incentive programs, advocacy programs, community and rural development programs, and Scripps Florida.

Enterprise Florida is required by law to create a strategic plan for economic development every five years. This plan, "Roadmap to Florida's Future: 2007-2012 Statewide Strategic Plan for Economic Development", is also updated every three years. The Roadmap sets out clear and distinct goals that Florida has embarked upon to strengthen and diversify its economy. Enterprise Florida focuses its business recruitment efforts on targeted industries: aviation/aerospace, clean energy, financial/professional services, information technology, life sciences, homeland security/defense, manufacturing and emerging technologies. According to an Ernst and Young report, the return on public investment in economic development in Florida was \$4.96 for every \$1 invested or 4.96:1 in FY2008-09.

Georgia. The state of Georgia's lead economic development agency is the Georgia Department of Economic Development, a traditionally structured commerce agency. The agency is supported by the Georgia Research Alliance, a privately funded 501(c)(3) corporation that funds and initiates economic development marketing programs used by the Department of Economic Development.

The Georgia Research Alliance, a public-private partnership, supports the Department's marketing efforts through marketing events and online tools. Georgia Research Alliance focuses on growing Georgia based companies and implements marketing retention and growth strategies targeted specifically at its existing industries. The group leads global trade missions and marketing outreach activities. The partnership also commissions studies to identify new and growing recruitment markets. A major role for GRA has been to create 56 "Eminent Scholar" programs in the Georgia system of higher education

The Georgia Department of Economic Development stays focused on core economic development programs since it does not manage rural and workforce programs. The agency focuses its global marketing efforts into targeted industry clusters including: aerospace, defense, and advanced manufacturing; agribusiness, bio-energy, food processing and logistics; health sciences and advanced technologies; corporate solutions – headquarters, data center, financial and insurance; innovations, emerging and small enterprise/Centers for Innovation program; and community and external alliances/entrepreneur and small business.

An example of how GRA helps economic development in Georgia is the location of the GE Smart Grid Center of Excellence this year. The center brings 400 new high-paying jobs to Georgia along with a \$15 million investment. The center will include the world headquarters for GE's new Digital Energy business and a smart grid engineering laboratory. GE and Georgia have already received \$1.3 million in federal grants.

Maryland. The Maryland Industrial Partnership Program (MIPS) is a project of the Maryland Technology Enterprise Institute that jointly funds technology- based research and development between Maryland industries and University of Maryland researchers. Applications come from industry, but must be co-authored by a faculty member. To date, the state has contributed \$27.8 million and industry has contributed \$115.6 million. The four top-selling products created with MIPS funding grossed an estimated \$12.1 billion in sales and revenue in 2006 and created over 2,600 jobs.

Michigan. With an appropriation of nearly \$400 million in 2006 and a commitment to spend an estimated \$2 billion over ten years, Michigan's 21st Century Jobs Fund is a direct effort to diversify the state's economy. The fund seeks to seed applied research in four areas: life sciences; alternative energy; advanced automotive, manufacturing and materials; homeland security and defense. Situated within the Economic Development Corporation, it builds off the state's efforts to create a life sciences corridor earlier in the decade.

North Carolina. The state of North Carolina's economic development efforts are led by the North Carolina Department of Commerce, a traditional statewide economic development organization, and the Friends of North Carolina, a non-profit 501(c)(6) organization that helps market the state globally and nationally. The Department of Commerce staffs and receives policy direction from the North Carolina Economic Development Board, the North Carolina Board of Science and Technology and the Commission on Workforce Development. The Department is organized into eight major focus areas and it includes the state's tourism efforts.

The state of North Carolina engages private sector leaders, the state General Assembly, university Presidents, community colleges, and other economic development organizations throughout the state through the esteemed 37-member, North Carolina Economic Development Board. The Board oversees state economic development research and planning and makes policy recommendations to the Governor and the General Assembly. The Friends of North Carolina, a non-profit 501(c)(6) organization that helps market the state globally and nationally, is an advisory council to the North Carolina Commerce Trade and Development Fund. The organization is funded through sponsorship levels of \$500-\$25,000 annually.

The North Carolina Economic Development Board is charged with creating a comprehensive economic development plan for the state. The Board is also responsible for holding the state economic development entities accountable for implementation of the economic development plan. This approach assures that the plan created does not sit on a shelf and that there is accountability that the plan is successfully executed.

Ohio. Ohio's thinking about issues related to technology-based economic development and how the state could play a catalytic role in this development dates back to the early 1980s. The state invested in the Thomas Edison Program in 1984, creating the Edison Technology Centers and Edison Incubators.

The state's second major endeavor, Ohio Third Frontier, was put in place in 2003 to support world-class research in industry-aligned platforms, to encourage collaborative research and commercialization activities, and to spur new technology company formation. This is a ten-year, \$1.6 billion set of programs that includes traditional state agencies like development and employment together with major input from the private sector. In addition, the State introduced two programs to increase the availability of early-stage risk capital in Ohio. The first, in 1996, was the Technology Investment Tax Credit program, which provides tax-based incentives for risk capital investments in technology startups. The second, in 2003, was the Ohio Capital Fund overseen by the Ohio Venture Capital Authority. This program was designed to bring more venture capital firms to Ohio and to encourage more venture capital investments in Ohio companies. To date OTF has funded 26 "Eminent Scholar" positions.

The Third Century Commission was created and is staffed in the Ohio Department of Development. However, it is advised by a board appointed by the Governor from the private sector and charged with the responsibility for investment strategy and outcome measurement.

Pennsylvania. Keystone Innovation Zones were established in 2004 to encourage communities with universities and research institutions to locate firms in close proximity to bring entrepreneurs and researchers physically together. Zones are supported by the state with annual operation grants up to \$250,000 and tax credits totaling \$25 million annually.

Texas. The Office of Economic Development and Tourism was created in 2003 and was aligned with the state's economic development programs in the Governor's Office. That same year, TexasOne was created which is a 501(c)(3) public-private nonprofit corporation charged with marketing the state globally and domestically.

The Governor engages private sector industry leaders through appointments to economic development related Boards and Councils including the Texas Workforce Investment Council, the Aerospace and Aviation Advisory Committee, and the Governor's Competitiveness Council. TexasOne is the primary funder of state-level economic development marketing with the goal of attracting and retaining high-value jobs. TexasOne is led by a nine-member, private sector board appointed by the Governor and the assistance of two ex-officio public sector board members, the Secretary of State and the Executive Director of the Office of Economic Development and Tourism. Membership in TexasOne ranges from an investment of \$1,000 per year for three years to \$50,000 per year for three years, with escalating benefits and decision-making authority associated with increased investment levels.

The Texas Cluster Initiative was created in 2003 to identify the clusters that would be the engines of job creation in the 21st Century in Texas, and to develop economic development strategies to support the sustained growth of six clusters. To build on the efforts of the Texas Cluster Initiative, the Governor created the Governor's Competitiveness Council in 2008 to create an agenda to increase the state's competitiveness and eliminate or minimize weaknesses in the state's six targeted industry clusters.

Within the past year Texas was able to use its public/private approach to bring the Vestas Corporate headquarters to the state. Vestas had been located in Oregon.

Utah. 2005, Utah's division of Business and Economic Development and the division of Travel Development were merged to create the Governor's Office of Economic Development (GOED). The GOED contracts with the Economic Development Corporation of Utah (EDCUtah), a nonprofit public-private corporation that manages the state's business recruitment efforts. Private sector leaders are heavily engaged in economic development in Utah. Through both the GOED and EDCUtah, private sector executives play key leadership roles. The GOED is advised by a 15-member Board of Directors appointed by the Governor for four-year terms and requiring Senate approval.

Board makeup is restricted to less than nine members from one political party and requires regional diversity. The Board advises the office on funding allocation and economic development strategies. The Director of GOED is appointed by the Governor and serves on his cabinet. The GOED contracts with the Economic Development Corporation of Utah (EDCUtah) to manage the state's business recruitment efforts. EDCUtah is a nonprofit public-private partnership that is funded by private and public sector contributions. The organization is led by a 100+ person Board of Trustees with representatives from the public and private sectors.

The Governor's Office of Economic Development focuses its efforts on seven industry clusters, including Aviation and Aerospace, Defense and Homeland Security, Energy and Natural Resources, Financial Services, Life Sciences, Outdoor Products and Recreation, and Software Development and Information Technology. The Office of Economic Development provides business incentive programs including post-performance refundable tax credits and cash grants. The incentives are all designed to generate a measureable economic development outcome such as the number and salary of jobs created, amount of new state revenue, long-term capital investment, competition with other locations, and if a company is within a targeted Utah cluster industry. The state reports that it generated \$13.65 in tax revenues for every state dollar spent n promoting Utah in FY 2008.

Virginia. The Secretary of Commerce and Trade oversees the economic, community, and workforce development of the Commonwealth. Unlike most states, the Secretary oversees 13 agencies, including the Virginia Economic Development Partnership (VEDP), a quasi-public state authority with responsibility for statewide economic development in Virginia. Created in 1995 to take politics out of statewide economic development, the agency is governed by a 21-member Board made up of private sector/chamber members with the Secretary of Commerce, the state's Finance Secretary and the Chancellor of community college system as ex-officio members. All board members are appointed by the Governor and General Assembly. The Board governs VEDP, and the staff reports to the Governor through the Secretary.

The VEDP is run as a quasi-public state authority, which gives it greater flexibility than that of a state agency. The employees of the VEDP are employees of the authority and the agency is not required to operate under the state procurement process. The VEDP does participate in the state's retirement system. The Executive Director of the VEDP is hired by the Board under a long term contract.

The 2010 budget for the VEDP was \$15,982,457 from the state's general fund. In FY2008, the VEDP reported that for every \$1 dollar spent on economic development, there was a \$9 return in 10 years and a \$12 return in 20 years.

Wisconsin. In 2004, Wisconsin pledged \$50 million to build two Institutes for Discovery, one public and one private on the University of Wisconsin campus. The investments build on \$317 million in public and private funds recently used to build research facilities through the BioStar program. The Institutes will occupy an entire block of the university campus and bring together multiple disciplines (biology, chemistry, computer science, engineering, nanotechnology, etc.) to conduct stem cell and other research.