



Washington State Clean Energy Leadership Plan Report

For the:



Accelerating Washington Clean Energy Job Growth

Navigant Consulting, Inc.
1201 Third Avenue, Suite 3320
Seattle, WA 98101



206.442.3000
www.navigantconsulting.com

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Table of Contents

Executive Summary	1
Leadership Plan Overview	6
Status of Washington’s Clean Energy Business Sector	6
Applying a Different Model to Accelerate Clean Energy Business and Job Growth	8
Funding Washington’s Clean Energy Economy Development	14
Expanding the Partnership’s Long-Term Benefit	15
Creating Clean Energy Jobs	15
Chapter 1 – Objectives & Background	17
Chapter 2 – Key Factors Influencing Clean Energy Job Development in Washington ..	19
Fragmented Clean Energy Market.....	19
Competitive Physical Resource and Asset Availability.....	20
Regulatory Influences and Challenges.....	21
Competing with Clean Energy Policies and Economic Support by Other States	25
Washington Clean Energy Company Departures	27
Chapter 3 – Selection Of Clean Energy Economy Segments for Leadership Plan	28
Chapter 4 – Two-Part Clean Energy Jobs Creation Approach	32
Energy Cluster Foundation Projects Component	37
Chapter 5 – Recommended Clean Energy Leadership Action Plans	39
Chapter 6 – Clean Energy Growth Partnership.....	46
Chapter 7– Funding Sources	50
Chapter 8 – Plan Timeline & Expected Job Growth Outcomes.....	53
Timeline for Implementation.....	53
Job Growth Estimates	54
Appendix A -Market Driver Initiative Description	A-1
Initiative 1: Combined Energy Efficiency, Green Building & Smart Grid Projects.....	A-2
Initiative 2: Renewable Energy Optimization & Smart Grid Deployment.....	A-5
Initiative 3A: High-Efficiency Biomass Power Initiative	A-9
Initiative 3B: Biofuel Refinery Demonstration Projects.....	A-11

Appendix B Process For Selection Of Clean Energy Segments.....	B-1
Objectives and Criteria	B-1
Factors Considered	B-1
Constraints	B-6
Phase I Screening Results	B-14
Appendix C: Representative State Clean Energy Support Summary	C-1
Appendix D: Alternative Clean Energy Segments for Separate Consideration	D-1
Nuclear.....	D-1
High Efficiency Vehicles.....	D-1
Electric Vehicles	D-2

Executive Summary

This report is the culmination of over a year's effort by the State legislatively created Washington Clean Energy Leadership Council to develop a Clean Energy Leadership Plan targeted specifically to grow clean energy businesses and jobs in Washington. The goal of the Leadership Plan is to transform the market for clean energy solutions in Washington to create sustained clean energy job growth. The Council's Leadership Plan details an innovative approach with two major components to accelerate clean energy jobs in Washington State. One component is a targeted approach to leverage funding to improve the ability of Washington State businesses to demonstrate market-leading clean energy solutions that grow jobs *without the need for continued subsidy*. The other component focuses attention on those areas where regulation needs to be better aligned with policies and actions enabling job-creating clean energy solutions to move forward. Together, these efforts can transform the market for clean energy in Washington to greatly enhance in-state clean energy businesses and jobs. Absent an effort such as this Leadership Plan, Washington will continue to fall further behind other states in clean energy jobs per capita.

Many states in the country have programs and funding which target clean energy business and job growth. The key steps of this Plan are a fundamental shift from how Washington and other states have sought to create clean energy jobs. By design, this Plan uses a more efficient and cost-effective way to accelerate leading-edge clean energy solutions and associated jobs. This approach is particularly targeted to address the limited state government funding available in this post-recession period, while still advancing the creation of sustainable clean energy jobs.

Why Does Washington State Need a Clean Energy Leadership Plan?

Despite its reputation as a state with a strong environmental ethic and its large reliance on hydroelectric energy sources rather than fossil-fuel resources, Washington's clean energy industry has grown slowly relative to competing states. In fact with only about 0.55% of total jobs in Washington in the clean energy sector, it ranks 14th in the nation and just barely above the average of all of the states. Our neighboring state of Oregon is the leading state in clean energy jobs with nearly twice the percentage of Washington. More importantly, other states are taking significant actions to increase their clean energy businesses and jobs. Absent a positive step forward with a cohesive plan and reasonable investment, Washington will not likely significantly increase its clean energy business and job standing and likely will cede ground to those states that are taking proactive steps.

Other states are meeting the clean energy job growth challenge with strong central clean energy policy adoption, alignment of clean energy job growth and regulatory policy, and funding from various sources to attract and build clean energy jobs. These other states are

undertaking this job growth effort largely in a manner that supports clean energy economic growth without burdening the overall state economy to do so. If the status quo in Washington State continues, other states and other nations will outpace Washington's clean energy business and the associated jobs. The Leadership Plan described herein outlines a plan to improve Washington's clean energy businesses and jobs to achieve long-term, sustained job growth and retention and compete effectively on a national, if not global basis.

What is Different About This Plan?

Most existing Washington and other state clean energy job plans rely heavily on direct state funding to invest in clean energy infrastructure within a state's borders to create jobs. During the period the state money is available to be spent, largely short-term jobs are created. When the funding is depleted, the jobs trail off as the funded projects wind up. Washington needs sustained clean energy jobs, and a growth trend in those jobs. Implementing this Plan will deliver sustained clean energy job growth.

Rather than "buying" clean energy jobs "dollar for dollar", this plan brings the purchasers of clean energy solutions and the providers of those solutions together in Washington to demonstrate *today's commercially viable* leading-edge solutions. Those solutions are identified and *partially* funded through a state-sponsored program that also brings in funding from the private sector and other non-state sources. In this manner, state funding is highly leveraged. Using "market driver initiatives", new clean energy solutions are demonstrated by Washington companies and their employees. Once the new solutions are demonstrated, they become commercially viable to be replicated without subsidy. This process creates a commercial market transformation in clean energy solutions. This is not government funded, new laboratory research with the hope of new technologies deployed decades in the future. These market driver initiatives will be specifically selected to demonstrate *combinations* of commercially viable clean energy technology solutions. This is also a material difference from many traditional "R&D" efforts that will provide jobs only if new unproven technologies are implemented years from now. *This approach deploys combinations of existing clean energy solutions in new ways, rather than seeking to invent or deploy yet to be proven technology on a standalone basis.* Solutions will be demonstrated in a manner that can differentiate Washington companies and employees in the deployment of clean energy.

What is a Clean Energy Market Driver Initiative?

Today, the use of clean energy solutions is largely in response to government mandates to meet certain energy efficiency, renewable energy or greenhouse gas emission targets or standards. These mandates have increased the use of clean energy technology, but not necessarily in a manner that best produces sustained new in-state jobs.

The Leadership Plan would bring utilities, building owners/developers, government and providers of clean energy solutions together to plan and implement leading-edge clean energy projects in those areas where Washington can differentiate itself. Following a major review of the market for clean energy jobs by Navigant Consulting, the Council has focused on specific initial clean energy segments where Washington has competitive advantages over other states, and potentially over other global players. This approach goes beyond deploying “tried and true”, but lower efficiency clean energy solutions as is so often the norm today. Instead, market driving, more efficient, clean energy solutions would be deployed in high-profile projects where purchasers of solutions, such as utilities and building owners/developers seek out the most promising new opportunities. By proving the validity of those new solutions in commercial scale demonstrations, Washington companies set new standards for clean energy solutions and become a part of a new wave of offerings that differentiates Washington companies.

Implementing the Leadership Plan will create demand for Washington clean energy companies and build jobs. By creating a framework where buyers of clean energy solutions *seek out* suppliers of leading-edge solutions, the market is transformed to have new commercially viable clean energy business growth, rather than relying 100% on government subsidy to create short-term jobs deploying yesterday’s less efficient solutions. The Leadership Plan explains this process in more detail in the Overview section of this report, and in Chapter 4.

Regulatory and Clean Energy Policy Alignment

Several key regulatory structures in Washington constrain the advancement of clean energy job growth. Creating a “culture” of clean energy business and job growth requires a strong, continued awareness and commitment to removing barriers and enhancing opportunities. While State government alone cannot assure clean energy economy growth, it is in a strong position to influence that growth through aligned regulatory and clean energy policy in areas including:

1. Clean Energy Regulatory Oversight
2. Regulated Utility Incentive Alignment and Barrier Removal
3. Streamlining of Permitting and Standards

Uncertainty about timing and extent of new building energy efficiency standards dampen innovation in new energy efficiency and green building solutions. Limited term contracts to access State-owned lands for biomass harvest for biofuel or biomass power constrains the ability to use this renewable fuel source. The prospect of after-the-fact disallowance of utility expenditure or investment in renewable energy or energy efficiency projects or programs is a disincentive to deploying leading-edge solutions. The risk of disallowance of utility costs of demonstrating new energy storage to better integrate renewable energy into the grid puts a

chill on market leading solutions in that clean energy segment. These are but a few of the regulatory issues that need resolution to help expand clean energy jobs in Washington.

If these issues have to be permanently resolved before efforts are taken to deploy market leading demonstration of clean energy solutions in Washington, new clean energy job growth will continue to be constrained, delayed or permanently thwarted. Positive actions can be taken to remove barriers and support new clean energy jobs. Establishing a senior energy advisor in the Governor's office in Washington to address these issues and to interact with the clean energy industry as a single point of focus would be a positive step forward. These and other regulatory alignment efforts are described in more detail in the Overview section and in Chapter 5 of this report.

Funding

This Leadership Plan will require funding. The report addresses a number of potential sources of funding to implement the plan. Of the many options theoretically available, two sources are most promising. For a quick start-up, a portion of existing economic development funding sources could temporarily be redeployed while a longer-term solution is implemented. One of the more promising long-term funding sources would be a so-called "system benefit charge." This mechanism is a minor fee for each kilowatt hour (kWh) of retail electricity supplied in the State of Washington. This mechanism is used in several states as described in more detail in Chapter 7 and is proposed at a level that would not affect the competitive levels of Washington utilities retail rates.

The minimum level of annual funding deemed necessary to implement the Leadership Plan is approximately \$20 million. A system benefits charge of \$0.00025/kWh would provide this level of funding at a cost of less than 20 cents a month per average residential utility customer – less than 10 percent of the cost of a single gallon of gasoline per month. Certainly larger funding levels than this would enable more clean energy job growth to happen sooner. However, the advantage of the market driver initiative structure is that this program funding is highly leveraged by other sources. The monies from new funding structures like the system benefit charge are needed for only a *portion* of the market driver initiative projects. Building developers, electric utilities, and alternative transportation fuel developers and their customers have budgets today for certain levels of clean energy solutions. This process provides *an increment* of funding to push the efficiency and technological achievement of demonstration projects up further.

Once these market-leading projects are demonstrated, they become the new standard that the market seeks – the leading-edge solution goes "mainstream" without subsequent projects requiring a subsidy. More importantly, Washington companies are those that lead the way and the jobs follow that market leadership here, in state.

This modest level of funding is further expanded through gaining matching dollars from federal programs and non-profit foundations seeking to achieve these same goals, as described in Chapter 7.

Creating a Central Organization Focus to Implement the Plan

Providing focus and implementing the market driver initiatives requires an entity with skills in the clean energy sector to address three key needs:

1. Provide the point of focus collectively for purchasers and suppliers of clean energy solutions in Washington;
2. Regularly seek non-state matching funds from the federal government, private enterprise and non-profit organizations to leverage the proposed state funding, as well as to administer the funding of the market driver initiatives projects; and
3. Provide timely and focused insight to regulatory and policy organizations regarding changes and alignment needed between regulation and clean energy policy to pave the way for accelerated clean energy business and job growth.

Chapter 6 describes a recommended scope and structure for such an organization. This organization cannot be a “government as usual” administrative organization. It needs to be a combination of (a) private enterprise professionals who are active in the clean energy sector in Washington and (b) a small set of government employees with energy industry experience and strong economic development skills dedicated to the successful transformation of Washington’s clean energy market and associated job growth.

Estimated Clean Energy Job Creation

Properly structured, the Leadership plan could create an incremental over 50,000 direct and indirect clean energy jobs and \$2.3 billion in Washington annual personal income by 2020.

The balance of this report provides a summary overview of the Leadership Plan and several chapters which provide more detail on the assumptions, analyses and recommendations embodied in the Plan. Appendix A provides example descriptions of the Market Driver Initiative projects. Appendix B provides more detail on prior work performed by Navigant for the Council to help focus the initial areas of the clean energy sector to enhance job growth. Appendix C provides a sample overview of the clean energy initiatives by other states. Appendix D lists some other clean energy segments which warrant further consideration in another economic development framework.

Leadership Plan Overview

Washington's clean energy technology industry has grown slowly relative to competing states. Continuing this trend will result in Washington losing additional job opportunities to other states and nations. In 2009, the Washington State Legislature created the Clean Energy Leadership Council to develop a leadership plan of actions to accelerate business growth and associated increased jobs in Washington as the world transitions to a clean energy economy. The Council, with the assistance of Navigant Consulting, Inc., has prepared a recommended Clean Energy Leadership Plan to meet this objective. This Leadership Plan recommends a framework to grow clean energy businesses and jobs in Washington by promoting deployment of leading-edge clean energy solutions in state as a platform for exporting clean energy solutions nationally and globally. In parallel, actions to address in-state clean energy growth barriers are proposed.

Status of Washington's Clean Energy Business Sector

The status of Washington's clean energy sector, "where we are", is a key factor in determining actions needed to accelerate clean energy job growth in Washington. With its robust hydroelectric system, Washington State is one of the cleanest economies in the nation with some of the lowest electric rates. Until the 2006 adoption of voter initiative I-937, under a policy practice that encouraged the lowest initial direct cost as the criteria for addition of new energy resources, the percentage of renewable energy in Washington's mix had been in decline. More recently, in-state policies¹ have driven the majority of the new renewable energy and energy efficiency investments and deployments in Washington. However, similar mandates and policies have been instituted in many other states in the nation, and internationally, often at a pace well ahead of Washington.

These policies, mandates, and trends have increased the use of clean energy in the state, but not necessarily created growth of businesses and jobs *here in Washington*.

Washington ranks fourteenth among states in overall economic activity², making it a relatively small market in clean energy when seeking to compete with states like California, Texas, New York, and Massachusetts. For the size of its economy, the state's electric utility market is highly fragmented with over 60 utilities, and approximately 50 percent of total electric customers are served by self-regulated public power utilities; the other half are served by three investor-owned utilities regulated by the Washington Utilities and Transportation Commission

¹ Renewable portfolio standards, sustainability initiatives, and building standards modifications

² As measured by state Gross Domestic Product, 2008 US Bureau of Economic Analysis

(WUTC). This fragmented structure has made it difficult to implement policies which drive investment in renewable energy and changes in the use of energy in homes and businesses.

For clean energy-related business and jobs to grow in Washington, companies need to be active in Washington. To compete in national and global markets, Washington companies need to be providing leading clean energy solutions. Most renewable energy sources and many of the energy efficiency solutions have initial costs that are higher than Washington's low-cost existing supplies. This cost pressure can cause regulated utilities to face disallowance by the WUTC of costs expended for clean energy resources. Public power utilities governed by their own boards don't face a regulator's disallowance of their incurred costs, but like their investor-owned utility counterparts, they are highly mindful of initial increases in costs from addition of clean energy resources to their portfolio. As a result, some form of initial cost assistance is typically required to overcome inertia and spur the adoption of new, market-leading clean energy solutions.

Other states face similar challenges and are meeting these challenges with various forms of assistance and strong alignment of clean energy and regulatory policy. California has a "public benefits charge" applied to all electric sales of regulated utilities in the state, providing over \$150 million annually to be used for clean energy research, pilot programs and new technology commercialization. California also has a central clean energy research and demonstration

Washington clean energy businesses have expanded out of state. For example, Seattle-based Blue Marble opted to build its bioenergy production facility in Montana due to favorable governmental action there. SolarWorld closed its Vancouver facility and moved, losing 100 jobs in WA and adding 1,000 at its new location in Hillsboro, OR due to favorable tax incentives.

funding entity for leading clean energy solutions. It provides for certain levels of pre-approval of expenditure for renewable energy and energy efficiency programs and incentives to regulated utilities for achieving target levels of energy efficiency. Similarly, Massachusetts provides \$20 to \$25 million annually for clean energy research and commercialization from a systems benefit charge, and like California, has an organization dedicated to advancing clean energy business. The state also funded a one-time \$20 million effort to initiate this program.

Washington's neighboring state of Oregon has adopted a Business Energy Tax Credit system to incent clean energy technology. Oregon also offers residential clean energy tax credits and provides annual clean energy research funding through the Oregon Energy Trust.

States previously not known for clean energy business have accelerated efforts as well. As an example, Iowa is midstream in implementing an adopted four-year, \$25 million per year, state general fund-sourced power fund to accelerate

clean energy business development. Actions by these and other states have attracted clean energy companies who started in Washington, but have later expanded or even relocated their businesses out of state. These contrasts to Washington's efforts are stark, and the implications for clean energy job growth important.

If the status quo continues, Washington will be outpaced by other states as well as other nations in clean energy technology market presence and the jobs that follow. Herein, we propose how the state can accelerate clean energy business and job growth to be among the leading states in this sector.

Absent implementing a Washington State leadership plan to improve the State's clean energy business climate, there are few compelling reasons to expect significant growth in clean energy business and jobs in the state.

Applying a Different Model to Accelerate Clean Energy Business and Job Growth

Washington needs concerted action to achieve critical mass in clean energy business development. For over 20 years, governments have adopted clean energy application mandates or "strong policy goals" to advance the implementation of renewable energy and energy efficiency. Bonneville Power Administration, as an example, has been a leader in energy efficiency programs. This model has served well to accelerate many clean energy technology applications, but not always with corresponding local economic growth. A better model is to intentionally align both public and private efforts, to develop market-leading clean energy solutions that can be replicated not only in Washington, but beyond its borders. The important difference here is that proving up these clean energy solutions in a commercial market allows them to be repeated on a commercial basis where buyer and seller recognize their value *without subsequent subsidy*. This method creates *sustained* clean energy business and job growth without returning back to government to seek the next funding contribution. Growth is then driven by deployment of leading-edge clean energy technology in Washington and then in interstate and international export markets.

Undertaking large-scale pilot or demonstration applications of clean energy solutions applied in new ways will reveal how best to solve current challenges in existing markets and pathways to meet performance, environmental and economic/financial goals. Such leading-edge demonstrations provide Washington-based companies with "reference" projects that can attract global attention and opportunities beyond state boundaries. Accelerated deployment using this systems approach can *inform* policy makers, end-users of the technologies, and the supply chain of equipment, software, and services for these solutions of their validity and value. This is a subtle, but profoundly important shift in the role of policy, mandates, and technology application to achieve market development, business growth, and job creation.

To compete with other states, Washington needs a focused effort to enable clean energy business to thrive and grow in state. Washington can make a difference by:

- » Bringing in-state providers of clean energy solutions to the buyers of those solutions;
- » Better aligning regulatory policies and practices with clean energy and job growth policy;
- » Providing targeted funding to reduce the initial risk of demonstrating market-leading clean energy solutions that create new jobs; and
- » Working with existing economic development organizations (government and non-profit) to develop clusters of economic activity throughout the supply chain to create a continuum of business and job development in the clean energy sector.

The Council and Navigant evaluated a wide range of potential clean energy sector opportunities to pursue to build jobs in Washington. The proposed Leadership Plan would accelerate the funding and deployment of so-called “market driver initiatives” in clean energy areas where Washington has inherent competitive advantages. As is explained in more detail later in this report, these areas of advantage include:

- » ***Energy Efficiency*** – Implementation of leading-edge, large scale combined energy efficiency, green building and smart grid solutions that leverage Washington’s strong green building and software sectors with upgrades to the electrical grid;
- » ***Renewable Energy Integration*** – Integration of renewable energy resources into the electric grid and utility portfolios to better demonstrate combinations of renewable energy, energy storage and smart grid solutions to move cost-effectively deploy the rising percentage of wind energy and later, the expected future development of solar energy in ways that can applied to other regional utility systems; and
- » ***Bioenergy*** – Demonstration of market-leading deployment of biomass power generation and development of transportation biofuels using Washington’s extensive forest- and agriculture-based resources and in-state capabilities.

Key Action Areas for the Clean Energy Leadership Plan - The proposed Leadership Plan addresses each of the above advantage areas with the following parallel action plans:

- » **Action Plan 1: Align Clean Energy Policy and Regulation** - Align regulatory practice with clean energy policies that support, rather than constrain, clean energy business and job growth in Washington;
- » **Action Plan 2: Accelerate High Profile Clean Energy Development** - Organize and partially fund large-scale or smaller high profile clean energy pilot projects to demonstrate new paths forward that showcase Washington innovation, resources, and skills as a platform to serve out-of-state markets; and
- » **Action Plan 3: Create a Focal Point for Clean Energy Economic Development** - Form and operate an entity dedicated to the creation and ongoing success of economic “clusters” that will build and sustain long-term growth and competitiveness of Washington’s clean energy industry.

These three proposed three action plans are summarized below and are described in more detail in the full Report.

Action Plan 1: Align Clean Energy Policy and Regulation -- Alignment of regulatory requirements and clean energy policy is key to growing clean energy jobs in Washington. First, Washington needs to establish a clear and durable public policy supporting clean energy business growth to provide the foundation for regulation that supports demonstration of clean energy solutions that will feed that growth. A single point of clean energy policy and regulatory oversight in State government would greatly improve the prospects of getting and retaining attention to this key lever to create a clean energy economy in Washington. Specific areas of regulatory change that would enhance clean energy economic growth in Washington include, but are not limited to:

- » *Provide greatly increased assurance of utilities’ recovery of investment in or expenditures for clean energy measures and programs that support the State’s clean energy policy ;*
- » *Amend utility rate structures to avoid disincentives to utilities for successfully implementing energy efficiency programs (so-called “decoupling”);*
- » *Create incentives to meet or exceed renewable energy and cost-effective energy efficiency targets;*
- » *Encourage and enable the regulated, investor-owned utilities to partner with public power utilities and similarly incent the public power utilities to collaborate and share in renewable energy, energy efficiency, and smart grid pilot projects to pool investment risk. Sharing the informative results of such pilot projects will benefit all retail*

customers in Washington as well as enhance Washington's in-state economic platform to more quickly access out-of-state markets; and

- » *Reduce siting and permitting barriers* to the development of renewable energy facilities that align with clean energy policy goals.

Examples of key actions needed to address the above regulatory issues and the types of clean energy growth benefits that would be achieved are described in the market driver initiatives section of this report, Appendix A.

Action Plan 2: Accelerate High Profile Clean Energy Development -- Efforts by other states and other nations to be leaders in this new sector of the economy means that Washington must move quickly if it is to catch up, let alone be among the leaders in clean energy sector business and job growth. This requires pursuing leading-edge clean energy technology applications that can be deployed quickly. Rapid deployment *within* Washington will lead to opportunities for Washington-based companies to create "reference" examples that can be used to win customers and businesses out-of-state. This action plan "pulls" demand for clean energy jobs. Properly implemented, near-term opportunities are proven and developed in state, leading to the expansion of businesses in state to serve a global market. Specific areas of change to enhance in-state clean energy economic growth include, but are not limited to efforts which:

- » Pursue development of new combinations of clean energy technology applications which can be deployed in the short-term – the next three to five years - by providing incentives and risk-reducing economic support to leading-edge pilot projects;
- » Select clean energy solutions for economic support and target solutions and business segments that can leverage the circumstances, resources, skills, and capabilities in Washington critical to creating job and business growth in Washington instead of importing out-of-state solutions; and
- » Facilitate purchasers of the clean energy solutions and the in-state providers of those solutions initially in sufficiently narrow areas to avoid diluting available in-state leadership and financial resources, but broadly enough to avoid picking winners and losers in technologies or solutions. The recommended Action Plan largely targets clean energy business solutions that are part of *integration* of existing clean energy technology into more rapid and expanded use in the economy. The emphasis on *integrating* existing clean energy technology with other technologies to *deploy clean energy solutions in new ways rather than seeking to invent or deploy not yet proven technology in a stand-alone fashion* is an important distinction as part of the Leadership Plan. It will result in more immediate job growth.

Action Plan 3 – Create a Focal Point for Clean Energy Economic Development – Clean Energy Growth Partnership Organization Formation -- Creating a sustained clean energy competitive advantage requires continuous focus to reduce market fragmentation, reduce regulatory friction and increase the odds for success in creating clean energy jobs in Washington. To this end, the State should form an organization dedicated to building clean energy economic “clusters” in ways that augment existing economic development organizations.

A small, focused joint industry and governmental “Clean Energy Growth Partnership” organization can accelerate the implementation of clean energy technology in a manner that brings buyers and providers of clean energy solutions together. Unlike a widely divergent and large stakeholder group, this “Partnership” organization would be directed by representatives actively involved in accelerating clean energy solutions – those who have “skin in the game” and a direct interest in successful outcomes. This can best be achieved by implementing market driver initiatives that unite technology solution buyers and providers, and government organizations involved in policy, economic development and regulation. By focusing on the clean energy growth needs of the State, the Partnership can more readily identify the priority needs in economic cluster development to inform the Washington Department of Commerce of those needs. In turn, the Department of Commerce can help guide participants in the clean energy economy in Washington to other resources to leverage. More importantly, the needs for economic development assistance that arise from the efforts to implement the market driver initiatives will be more clearly revealed. This focused attention better enables mobilizing the existing resources of the Department of Commerce and other economic development organizations within the State.

Focusing Clean Energy Job Growth Through Market Driver Initiatives -- Following a detailed review of a wide-range of technologies and segments of the clean energy-related economy in Washington and beyond, three major areas were selected for initial attention in this Action Plan.

- » *Combined energy efficiency, green building and smart grid projects* - Demonstrate the potential deeper levels of energy savings of high profile, leading-edge combination energy efficiency, green building and smart grid applications. This initiative will inform utilities, regulators, and electric consumers of the types of savings that can be achieved using leading-edge solutions rather than deploying less effective known measures and programs.
- » *Renewable energy optimization and smart grid deployment* – This clean energy area is rich in opportunity and scope. This Market Driver Initiative will demonstrate combinations of renewable energy, energy storage and smart grid applications in ways that demonstrate paths to more cost-effectively integrate renewable energy resources into the mainstream of customer and utility use. Proving these combinations of solutions in Washington will enable Washington companies to provide those solutions outside the state borders.

Types of Market Driver Initiative projects that would be undertaken include, but are not limited to, combinations of:

- Energy storage to better time delivery of renewable energy supplies like wind and solar energy to meet the daily pattern of customer loads; and
 - Improved forecasting of renewable energy time-of-day and seasonal production to better plan and integrate its production into the utility grid and improve utilization of existing electric transmission system. This initiative will improve delivery of energy in state and for using smart grid technologies to optimize the use of existing and new transmission facilities.
 - Use of smart grid applications to improve the efficiency of the existing transmission system to deliver renewable and conventional energy to in-region and out-of-region markets.
- » *Accelerated use of biomass energy resources* – This Market Driver Initiative includes both renewable power production and alternative transportation fuels. Types of projects that would be undertaken include, but are not limited to those which:
- Deploy high-efficiency biomass power generation applications using Washington’s forest and agricultural biomass resources to demonstrate the ability to use these resources in environmentally favored ways; and
 - Advance the use of biobased aviation fuels; and
 - Accelerate research in creating high value, non-energy products from “biorefineries” to support the reduction in cost of biofuel production to accelerate market use of such fuels

There are significant opportunities in each of these areas for near-term applications to deploy proven or near-proven clean energy technology. In addition, these areas share the challenge of a highly fragmented market: many buyers of different needs, sizes and buying patterns; and many suppliers of different parts of the clean energy supply chain. The Leadership Plan will organize and implement *market driver initiatives* in these clean energy solution areas to overcome the fragmented nature of the market and friction in regulatory practice for these clean energy solutions. In turn, the Leadership Plan will help demonstrate how best to deploy combinations of clean energy technologies as a means to rapidly develop and expand businesses and jobs. Upon demonstrating the commercial viability of these clean energy solutions, they can be replicated in Washington and elsewhere without subsidy. The business and job growth this creates then benefits Washington without a continued obligation for funding of those initiatives.

These market driving initiative, large-scale pilot/demonstration projects can be structured to be large enough, or high profile enough, to provide validity of performance and cost without

being so large that if they do not perform as expected that it results in an undue cost burden to rate payers. If the projects perform as expected, they will reveal the pathway to cost-effectively, deploy such applications to be undertaken more broadly, on a sustainable foundation.

Equally importantly, the leading-edge solutions and applications are demonstrated *in Washington, by Washington businesses and employees*. Success begets success, and marketing of the success within and outside of Washington creates demand for similar leading-edge solutions and services, rather than yesterday's sub-optimal solutions.

Funding Washington's Clean Energy Economy Development

Convening buyers and solution providers along with government representatives to pilot leading-edge solutions in targeted clean energy sectors will require clear intent, prioritized effort, and durable funding support. Gaining the attention and tapping the knowledge and interest of active participants in the clean energy technology segments in Washington will require some commitment to funding the market driver initiatives such as those described in this Report.

As described in more detail in the full report, funding levels for individual Market Driver Initiative projects could be from \$1 million to perhaps \$25 million. Only a *portion* of these funds would come from the Clean Energy Growth Partnership. The balance would be funded on a commercial basis by actual project sponsors, such as utilities, commercial building developers, biofuel production companies, or biomass power generation developers and other non-state sources. The federal government has funded, and in the near-term is likely to continue some level of funding for, well-designed clean energy technology projects that can be shown to enhance job and business growth. Various non-government foundations (e.g., the Pew Charitable Trusts, the Energy Foundation, the Paul G. Allen Family Foundation Science & Technology Innovations Program, the Bullet Foundation, the Doris Duke Charitable Foundation, the William and Flora Hewlett Foundation, the ClimateWorks Foundation, the Rockefeller Foundation, among many others) share similar interests.

If Washington State provided annual funds contingent upon a match basis of, for example, one to two times to leverage the smaller share of State contribution, an annual contribution of \$20 million from state sources could become \$40 to \$60 million annually. As many as three to ten Market Driver Initiative projects could be implemented each year once the program was fully operational, depending upon the amount of non-state funding that could be leveraged and the mix of projects. That level of funding, particularly on a consistent multi-year basis, will attract attention of buyers and sellers in the clean energy technology sector. Most importantly, *it will match the lower range of efforts of other states to create clean energy jobs and provide a reason for clean energy solution companies to seriously consider investment and expansion in Washington rather than elsewhere.*

Identifying and adopting one or more methods for providing this funding is crucial. The State could choose to reprioritize general funds from lesser priority work to this Leadership Plan. Or, the State could dedicate new revenue accruing from the expiration of past tax exemptions. Another equitable approach used by some states is a “system benefits charge” approach, applying a small fraction of a penny for every kilowatt-hour of energy sold within a state as a means to create a funding pool for clean energy programs rather than relying upon State general funds. If applied to all electric utility customers in the state uniformly, regardless of type of ownership, an annual fund of approximately \$20 million to provide shared clean energy solutions and economic development would cost no more than \$0.00025 per kilowatt-hour, or an average of less than 20 cents per month for a typical household. Such a funding approach provides at a minimal cost for citizens of the entire state to benefit from the clean energy jobs created under this Leadership Plan. This and other options for sources of funds provided for the Clean Energy Partnership are discussed in more detail in Chapter 7 of the Report.

Expanding the Partnership’s Long-Term Benefit

The example market driver initiatives described herein are only part of the recommended Leadership Plan. The convening of stakeholders in the clean energy technology sector in Washington also includes bringing together parties with a long-term interest in improving in-state opportunities for research/innovation, work force training, financing/funding and marketing of clean energy technology solutions (and businesses/jobs) to markets outside the State’s boundaries. Chapter 4 of the full Report provides additional explanation of an important feedback loop between these accelerated clean energy technology projects and the better formation of an economic cluster that provides a foundation for future long-term growth.

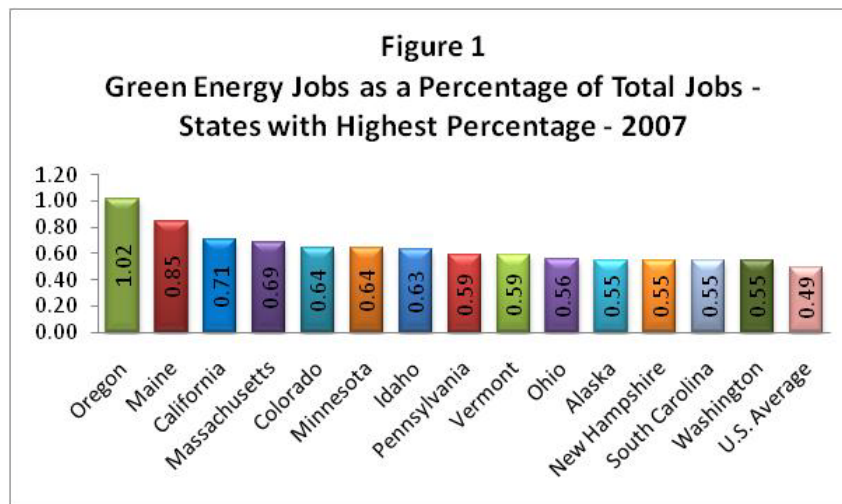
Creating Clean Energy Jobs

The Clean Energy Partnership could be formed by the end of 2011. By the end of 2012, the Partnership could be responsible for successful initiation of leading-edge clean energy projects that form the platform for Washington’s clean energy job growth.

These outcomes will produce clean energy jobs. Total *clean economy* jobs in Washington have been estimated at around 1.6 percent of total in-state employment or about 45,000 jobs³. Independent research by Navigant indicates that approximately 35 percent to 45 percent of those *clean economy* jobs are actually in *clean energy*-related fields, resulting in approximately 16,000 to 20,000 jobs⁴. Based on a study by the Pew Charitable Trusts, as shown in Figure 1,

³ 2008 Green Energy Jobs in Washington, Washington State Employment Security Department.

⁴ Phase I: Washington State Clean Energy Technology Landscape, April 2010, Presented to the Washington Clean Energy Leadership Council.



clean energy jobs in Washington are estimated to be about 0.55 percent of total jobs. This is consistent with the Navigant estimate referenced above and results in a national ranking in clean energy jobs for Washington of roughly 10th place, tied with several other states⁵.

Based on the recommended Leadership Plan, with implementation starting in 2012, Washington could increase clean energy jobs by 2.5 times by 2020. Ignoring the multiplier effect of indirect jobs created by new primary jobs, this could conservatively add \$1.2 billion annually in clean energy base wages in Washington⁶. Including a conservative estimate for indirect jobs created from these clean energy base level jobs, implementation of this Leadership Plan could result in an incremental over 50,000 jobs and approximately \$2.3 billion (in 2010 dollars) in annual employment income to Washington by 2020, with an increased growth rate from that level for many years to come. Increases of in-state income in clean energy will come not only from the numbers of jobs created, but also from the typically higher than average incomes associated with clean energy employment.

The remaining chapters of this report provide further details of the data, analyses and recommendations reflected in this Overview.

⁵ The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America, June 2009. The Pew Charitable Trusts.

⁶ Average annual salary based on U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, State Annual Personal Income, Table SA05N - Personal income by major source and earnings by NAICS industry (line 50 - Wage and salary disbursements) and Table SA27N - Full-time and part-time wage and salary employment by NAICS industry (line 20 - Wage and salary employment by place of work), Washington, 2008. <http://www.bea.gov/regional/spi/>

Chapter 1 – Objectives & Background

Throughout the nation and globally, clean energy technology is widely viewed as a major future source of economic development that can drive business and job expansion. The Washington State Legislature properly noted this important opportunity in 2009 when it created the Clean Energy Leadership Council and legislation calling for preparation of a clean energy leadership plan. Implementing this leadership plan will develop and expand companies and jobs in the clean energy sector in Washington on a sustained basis. The objective is to create and expand clean energy solutions, products and services provided and performed in Washington for state, regional, national and global markets.

Knowing the status of Washington’s clean energy businesses and jobs is an important first step to developing a plan to grow it. Solid information on existing clean energy technology jobs is difficult to obtain due to the fragmented nature of this industry. One of the challenges in growing clean energy businesses and jobs is the lack of a clearly defined clean energy “sector”. As shown in Figure 1-1, clean energy is a part of a much larger “clean or green” economy which encompasses a wide range of broader non-energy sectors and associated technology applications. The focus for this clean energy Leadership Plan is on the broad clean energy

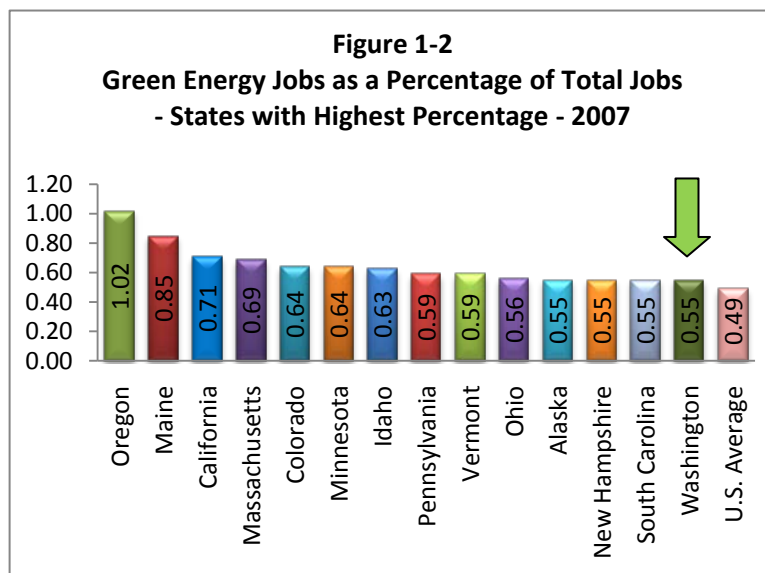
Figure 1-1
Clean Energy Business Scope

Segment		Sub-Category			Strategy Scope
CLEAN ENERGY	Energy Generation	Renewables			
	Energy Storage	Electrochemical	Mechanical		
	Energy Infrastructure	Transmission	Smart Grid		
	Energy Efficiency	Buildings	Services		
	Transportation	Vehicles	Fuels		
ENVIRONMENTAL	Water and Wastewater	Water /Wastewater Treatment	Water Conservation/ Reuse		
	Air and Environment	Emissions Control / Monitor	Cleanup / Safety	Trading / Offsets	
	Waste Reduction	Prevention / Reduction	Monitoring / Control	Recycling	
	Agriculture	Natural Pesticides	Land Management	Waste Reuse	

segments highlighted in Figure 1. Even this segmented definition of clean energy encompasses too broad of a range of business areas to focus on to create a state-wide economic development plan for clean energy business and job growth. An even further focused effort is needed to achieve results.

Despite the State's reputation in clean energy and a green economy, the 2008 Washington Green Jobs Survey⁷ found less than two percent of Washington's jobs were "green economy" jobs – about 45,000 jobs in all. Of that low amount, *clean energy* jobs are only a portion. A study by the Pew Charitable Trusts found that *clean energy* jobs in Washington are only about 0.55 percent of total jobs⁸. Separate research by Navigant resulted in similar findings as reported in the Phase I report to the Council, with about 16,000 to 20,000 *clean energy* jobs in Washington⁹. This level of clean energy jobs is barely above the national average, and puts Washington in the lower range of the top ten clean energy job states.

This low level of clean energy technology jobs in Washington is indicative of the nascent nature of the clean energy economy nationally, if not globally. A well-targeted implementation plan could make significant strides in business and job creation, because the leading states are not that much further ahead. Conversely, no action will result in other states further outpacing Washington in clean energy job growth. Appendix B provides more detail on job numbers.



⁷ 2008 Washington State Green Economy Jobs, WA State Employment Security Department, January 2009; and Addendum, July 2009.

⁸ The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America, June 2009. The Pew Charitable Trusts.

⁹ Phase I: Washington State Clean Energy Technology Landscape, presented April 13, 2010, by Navigant Consulting, Inc.

Chapter 2 – Key Factors Influencing Clean Energy Job Development in Washington

To prepare a clean energy jobs development leadership plan, the following key factors that influence clean energy business growth need to be addressed:

- » The fragmented nature of the clean energy market;
- » The availability and competitiveness of physical resources and other assets that differentiate Washington from other states;
- » Regulatory influences that affect ability of clean energy jobs to expand; and
- » The ability to compete with the policies and economic/financial support of clean energy by other states.

Fragmented Clean Energy Market

The clean energy market is highly fragmented on the supply side as well as the buyer side. A fragmented clean energy *solutions provider* market makes it difficult for buyers to know which solutions are appropriate, or where to look for desired solutions to clean energy needs. A highly fragmented buyer market makes it more difficult for sellers to target and present their solutions to buyers. This market fragmentation is even more significant in Washington, particularly on the buyer side. The market for energy efficiency and green buildings is highly fragmented in most markets with a broad array of commercial building developers and owners, numerous governmental building owners, and the normal breadth of residential building owners. That fragmentation is compounded by the broad ranges of climate within Washington from west to east, affecting energy efficiency and geographic variance in clean energy resources such as wind, solar input, and available biomass resources.

The electric utility *buyers* market is also highly fragmented in Washington, with over 60 electric utilities. Depending upon how you measure it, these are roughly split evenly between investor-owned utility service providers and consumer-owned, public power utilities. Those public power utilities, in turn, vary from larger utilities like Seattle City Light, Tacoma Power and Snohomish County Public Utility District to very small PUDs and electric coops, and sizes in between. Added to that size and ownership fragmentation, some of the public power utilities receive nearly all of their power supply from Bonneville Power Administration and others have more of a mixture of their own power supply resources and Bonneville purchases.

In the bioenergy sector, buyers can be transportation fuel users at the wholesale and retail levels, governments, power generation developers and electric utility power purchasers.

Clean Energy Supply Chain - Clean energy solutions from a supply perspective can be simple or complex. Most solutions involve a number of components and the supply chain of materials and various services required can be broad. Some examples of the supply chain in this sector are shown in the summary to the right.

There are a variety of policies, regulatory structures and requirements that affect both buyers and sellers, including:

- » Federal, state and local building codes;
- » Federal grid reliability requirements and standards;
- » Federal and state tax, financing and economic support policies;
- » Varying mandates for buying clean energy solutions;
- » Incentives for clean energy investment or deployment that vary by buyer type, market segment, technology, and timing of commitment or installation; and
- » Provisions for utility buyer cost recovery and investment authority.

This latter issue is particularly important and strongly influences the pace at which leading-edge clean energy technology can be implemented and associated jobs created, as is discussed later in this chapter.

This level of market fragmentation requires mechanisms to efficiently bring buyers and sellers together to be properly informed to supply what the buyer wants and for the buyer to be aware of solutions available. The recommended Leadership Plan addresses this important need.

Competitive Physical Resource and Asset Availability

Washington has some specific clean energy resources and assets which can help differentiate it from other states, including, but not limited to:

- » Extensive wind energy resources, resulting to date in being the fifth largest wind energy production state in the country;
- » Major forest and agriculture-based biomass resources that can be used for power supply and transportation fuel conversion;
- » Nation-leading green building design and development firms;

Clean Energy Supply Chain Fragmentation

Clean energy solutions can include many parts and players, such as:

- » Device designers
- » Manufacturers
- » Software designers/suppliers
- » Communications applications
- » Construction labor
- » Architects and engineers
- » Attorneys and advisors
- » Building material suppliers
- » Fuel transporters
- » Installers, O&M providers
- » Financial solution providers
- » Insurers

- » Global leaders in software and information technology;
- » Significant university, government and private research and development organizations; and
- » Substantial existing low-cost hydroelectric power supply.

The availability of these resources and assets in Washington figure strongly in a Leadership Plan for clean energy sector job development and helps differentiate Washington from other states.

Regulatory Influences and Challenges

Clean energy solutions, particularly energy efficiency measures and renewable energy power generation, have been largely driven by regulatory mandates, particularly in the last decade. Washington is among the thirty states and the District of Columbia that have adopted either goals for renewable energy resource deployment or more firm Renewable Portfolio Standards (RPS) that mandate certain percentages of renewable energy resource supply for electric utilities. Many states have also adopted guidance, incentives, or specific obligations for levels or types of energy efficiency measure implementation in utility service territories. Several states have also adopted their own high-efficiency building code standards. Level and type of enforcement of these mandates also varies.

As in other states, these clean energy mandates for utilities have resulted in significant investment in clean energy technology and services in Washington. However, much of the materials, equipment and services to meet these mandates are imported from out of state, and/or out of country. Washington requires most of its utilities (as a function principally of size) to meet 15 percent of total customer electricity requirements with renewable energy supplies by 2020, with a specified periodic ramp rate to achieve that level. In addition, each regulated Washington utility must “pursue all available conservation that is cost-effective, reliable and feasible”¹⁰. These mandates require action by the affected utilities, but regulated utilities in Washington are subject to retroactive prudence review of expenditures that can result in after-the-fact disallowance of investment or expenditure. This regulatory situation is an important influence on the ease and speed of demonstrating leading-edge clean energy solutions by Washington companies.

There are three main areas where regulatory and energy policy alignment can be improved and acted upon by State government in Washington:

1. *Clean Energy Regulatory Oversight Function* – State (and local) government creates laws, rules and regulations incrementally. Over time, it creates a disorganized web of requirements that can be inconsistent, with resulting unintended barriers. Other states, such as Colorado and California, have created single point offices to be the point of

¹⁰ RCW 19.285.040(1)

contact on clean energy regulatory and business policy matters. Simply having a “go-to” person in State government whose purpose is to be aware of and be an advocate for streamlining regulations and government actions related to clean energy is an important step. Tying such a clean energy “ombudsman” role with the efforts recommended in this Leadership Plan will be even more influential and helpful in having State government help support clean energy economy growth in Washington.

2. *Permitting Approvals & Standard Setting Procedures* – Permits for facilities, approvals for uses of State lands, consistency in energy and materials-related matters in building standards influence the ability of clean energy businesses to accelerate their growth in Washington. Streamlining and avoiding inconsistency in these types of approvals and requirements are an important key to enhancing Washington’s ability to demonstrate market-leading clean energy solutions.
3. *Regulated Utility Incentives & Cost Recovery Policies* – Regulated electric utilities are an important market and proving ground for clean energy solutions. In the balance between protecting retail customer (ratepayer) interests and advancement of clean energy solutions, conflicting interests can arise. This conflict can be overcome with proper alignment of regulatory policy and clean energy policy. Some of it may be achievable administratively and in other cases legislation may be required. The role of the regulated utility in implementing clean energy solutions also influences the prospect of public power (non-regulated) utilities. Clean energy solution implementation can involve certain levels of risk. Sharing that risk, and lessons learned, among the larger regulated utilities and among the range of size of public power utilities can help accelerate clean energy solution adoption.

The following provides some examples of desired improved regulatory and clean energy policy relating to each of the above three areas.

Advanced high-efficiency building codes- Building codes linked with state energy policy can dramatically influence growth in the clean energy industry. As an example, the California Energy Commission adopted a “reach” goal of net-zero energy for all new residential buildings by 2020 and all new commercial buildings by 2030. Washington could align building codes to achieve similar targets. Interim targets and standards that enable demonstration projects to prove cost-effectiveness could create a strong foundation for longer-term standard setting. Funding focused research to demonstrate commercial viability of leading-edge energy efficiency and renewable energy applications to reach these goals creates in-state industry knowledge, which then can be exported nationally.

Energy Efficiency Regulatory Policy Disincentives – Regulated utilities can have disincentives for energy efficiency investment due to rate structures and risk of disallowance of expenditures for energy efficiency measures. Utilities can receive incentives based on improved rates of

return on investment. Washington's regulated utilities don't fare well in any of these areas. A focused effort to realign these policies, mindful of the need to protect the interests of the utility retail customer, would enhance Washington's clean energy economy.

Rate Structure Disincentive - Electric utility¹¹ retail rate structures typically are largely "volume based". Recovery of fixed and variable costs often are tied significantly to the per-unit volumes of energy sold to customers. Much of a utility's costs are fixed, resulting in risk of under-recovery of costs when energy efficiency programs work as planned and customer use of energy declines. Absent rate structure adjustments to account for this change, lower volumes of energy sales, all other matters equal, result in a utility collecting less money. Public power and investor-owned utilities alike are then faced with the challenge of increasing per-unit electric rates to recover their fixed costs. Customers who reduce their energy use save in their total bills by using less energy. Avoidance of higher incremental costs of energy supplies due to effective energy efficiency programs lowers overall system costs, but the fixed cost components of the utility need to be recovered over a smaller volume of energy. For the investor-owned utility, this reduced energy sales volume with successful energy efficiency programs also means their return on investment can decline unless adjustments are made to their rate structure. Public power utilities have the ability to adjust their own rates (although never an easy process), while regulated utilities require approval of their regulator to make such adjustments.

One important means to avoid the above disincentive to energy efficiency programs is to "decouple" the margins that regulated utilities make such that those margins can be made or even improved (incentive) with the reduction in energy sales from energy efficiency programs. Some states have adopted such programs. Washington is exploring that option as of the date of this report.

Energy Efficiency Cost Recovery Uncertainty - Some states allow for investments in energy efficiency to be capitalized, just like any other utility asset, but provide a slightly higher rate of return. Other states give a small increase in overall rate of return to a utility based on meeting certain energy efficiency achievement thresholds. This type of approach incents utilities to more aggressively pursue energy efficiency as the preferred resource. By contrast, Washington's regulatory requirement that "all cost-effective" energy efficiency measures be implemented by those utilities covered by the policy does not provide that same incentive.

Determining what measures and associated technologies fit the "cost-effective" criteria is not clear. Materials used, code and construction practices, building operations, facility maintenance, and ability to monitor energy use for individual use types, all influence cost effectiveness but are largely outside the scope of how utilities are regulated. Although not an intended outcome, this ambiguity creates incentive to utilities to rely only upon well known,

¹¹ And natural gas utility

highly proven, and perhaps out-of-date or suboptimal energy efficiency measures. This is not conducive to demonstrating leading-edge energy efficiency businesses and capturing the clean energy jobs that accompany such demonstration in Washington.

The exposure of regulated Washington utilities to after-investment disallowance of expenses if those measures funded are not deemed by the WUTC to be prudently incurred provides an even more chilling effect on deploying leading-edge technology. Instead, it forces a “race to the known”. The most proven, most easily undertaken, rather than leading-edge measures and technologies, will be deployed. To do otherwise places the utility at risk of being disallowed recovery of monies spent in the effort to achieve leading-edge energy efficiency. This approach leaves the systemic rewards of business and job growth to more innovative states and nations.

In addition to implementing “yesterday’s solutions”, once some such measures are implemented, it precludes cost-effective future implementation of leading-edge technology, due to the skimming of the cream of the easiest savings in measures that could have to be replaced with new, more efficient technology if more advance technology applications or combinations were to be implemented. In effect, the policy of “take no risk”, imbeds the risk of locking in sub-optimal measures for years or even decades. This does not lead to clean energy business growth leadership, nor the jobs that would come with it.

Clean energy jobs follow successful market-leading innovation. Lack of prior approval of expenditure levels by utilities and risk of retroactive disallowance of expenditures for renewable energy and energy efficiency in Washington creates disincentives to deploy market-leading clean energy solutions. Failure to align regulatory policy and clean energy policy leaves the rewards of clean energy job growth to other more innovative states and nations.

Renewable Energy Resource Advancement Disincentives - Similar regulatory disincentives affect renewable energy. Leading-edge renewable energy resource solutions draw market demand and provide business and job growth. Demonstrating reasonable scale examples of leading-edge renewable energy resource deployment is a prerequisite to attracting buyers from any geography. Typical “next generation” clean energy resources are likely to initially have higher costs than the tried and true technologies or solutions. The risk of disallowance of investment or expenditure by a utility deploying leading-edge renewable energy makes it unlikely for them to pursue such options.

This regulatory risk has indirect effects on public power utilities as well. These utilities do not face the risk of a regulator disallowing costs expended on energy efficiency or renewable energy. Like the investor-owned utilities, however, public power utilities still face concerns

about increasing net costs to their retail customers. If the larger regulated utilities are unwilling to deploy leading-edge clean energy solutions for the regulatory reasons explained above, it makes it more difficult for public power utilities, particularly those dozens of utilities of much smaller size, to do so either.

A different business and regulatory model -- one that benefits without undue burden on all in-state energy consumers -- is needed and Washington can implement one. An effective clean energy leadership plan will include regulatory alignment that better matches clean energy job growth objectives while protecting the interests of utility ratepayers.

“An effective clean energy leadership plan will include regulatory alignment that better matches clean energy job growth objectives while protecting the interests of utility ratepayers.”

Competing with Clean Energy Policies and Economic Support by Other States

Creating and growing clean energy businesses and jobs requires active competition with other states which have similar objectives. Across the nation states are implementing a variety of actions to court clean energy companies to their state, or help those who are there now to grow in their state, faster. Actions that are used in varying combinations include, but are not limited to:

- » Tax credits;
- » Direct incentives;
- » Pre-approvals of utility clean energy expenditure;
- » Funding energy efficiency and renewable energy research that leads to commercial adoption of leading-edge solutions;
- » Risk-sharing clean energy funds or technical assistance;
- » Matching funds for federal and foundation proposals;
- » Single purpose clean energy economic development organizations; and
- » Clean energy project regulatory assistance.

Some states have long-term programs including several of the above measures and others have implemented temporal measures as a means to “jump start” clean energy economy expansion. Appendix C to this report provides a summary table of representative clean energy policies, mandates, funding support and incentives for clean energy for several states. This demonstrates the level of competition among states to bring clean energy jobs, and the associated lower carbon reduction and other environmental benefits of clean energy expansion¹². Some of these examples include:

¹² While clean energy business and jobs are one of the significant reasons states implement various clean energy policies and mandates, carbon reduction, fossil fuel independence and other objectives are also sought through such programs and measures.

- » Oregon has implemented a Business Energy Tax Credit (BETC) for qualifying renewable energy, energy efficiency, sustainability, and alternative transportation fuels investments and a residential energy tax credit¹³. It has also provided for limited “pre-approval” for utility investment in clean energy.
- » Idaho has adopted one of the most progressive electric rate “decoupling” structures in the Northwest, building a platform for future energy efficiency implementation.
- » California supports clean energy on several fronts, including, but not limited to:
 - The highest RPS requirement in the country and is contemplating increasing it;
 - A “public benefits charge” (PBC) applied per kWh of retail electric sales generates \$150 million to \$200 million annually for clean energy research, development, and deployment;
 - A central governmental organization that applies a portion of the PBC monies to clean energy R&D, other funds go to competitively bid programs among utilities and clean energy businesses in collaboration to demonstrate leading-edge solutions;
 - A California Solar Initiative tax incentive program; and
 - A “bioenergy action plan” to focus development in that area, along with in-state bioenergy production targets
- » Massachusetts is similarly active in clean energy acceleration with:
 - A temporary \$200 million 2010-2012 fund for energy efficiency investment;
 - A long-term “systems benefit charge” similar to the PBC of California that provides \$20 to \$24 million annually for clean energy programs which was initiated with an incremental one-time \$20 million of state funds to accelerate its implementation and effectiveness; and
 - A solar renewable energy credit program as part of the state RPS that provides approximately \$75 million/yr.
- » Iowa, with less than 45 percent of the population and gross domestic product of Washington, adopted a 4-yr, \$100 million total state general fund-sourced clean energy jobs and energy independence fund, among other clean energy advancement initiatives.

Information on several other leading states in clean energy program advancement is included in a representative summary in Appendix C. There is strong competition for clean energy business and jobs. Business and job growth in clean energy will be significantly influenced by opportunities in states that reduce risk of expansion and create opportunities to demonstrate leading-edge clean energy solutions that the rest of the world can see and evaluate.

¹³The extent of *utilization* of the BETC has resulted in statewide tax revenue effects that have raised controversy in Oregon.

Washington Clean Energy Company Departures

Building new clean energy business and jobs is not the only challenge. *Retaining* the firms that are here now is equally important. Recent examples demonstrate the strength of the economic pull of clean energy jobs creation programs of other states. Seattle-based Blue Marble recently decided to expand its biofuel operations in Montana rather than Washington due to an economic package and focused regulatory compliance assistance offered by Montana. Issues cited in that move include challenges in navigating the numerous siting and permitting requirements for bioenergy projects in Washington, relative sales tax rates, and the lure of Montana's Board of Investments for loan guarantees for firms who create jobs in that state.

Similarly, SolarWorld, a large German solar firm in 2009 had a Vancouver, WA plant location, but moved to Oregon due to the Business Energy Tax Credit in that state, among other reasons. Vancouver lost 100 jobs and Hillsboro, OR is reported to have gained or will gain 1000 jobs from the move and expansion. The number of clean energy manufacturing facilities that chose Oregon over coming to Washington is even greater. Firms in solar, wind energy and high tech battery manufacturing have recently selected Oregon over Washington based on state energy tax credits and loan guarantees.

The clean energy business growth market is highly competitive. Washington needs a focused plan and commitment to implement it if the state is to successfully compete to retain and grow clean energy jobs in Washington. Its plan needs to address as many of these competitive challenges as possible.

Chapter 3 – Selection Of Clean Energy Economy Segments for Leadership Plan

This chapter provides an overview of the process used to select high profile target areas of the clean energy sector to initially focus attention as part of a Clean Energy Leadership Plan to grow businesses and jobs in Washington. A more detailed review of the considerations and processes used to narrow this initial focus is found in Appendix B to this report.

The recommended clean energy business formation and expansion plan should be focused on opportunities where:

- » There is a large U.S. and global market;
- » Washington has clear capabilities and competitive advantages compared to other states or nations, and
- » There are opportunities in state to demonstrate capabilities and competencies for leading-edge solutions that could then be exported.

Why Narrow the Focus? – Significant discussion was held by Clean Energy Leadership Council members and stakeholders regarding the need or reasons for narrowing the scope of the clean energy sector for attention in developing a strategy and implementation plan to grow clean energy jobs in Washington. Among those concerns were the prospect of excluding certain technologies or resources, and the risk of “picking winners in losers”, among clean energy solution types or companies.

The reasons for some narrowing in the initial scope of clean energy sectors in the Leadership Plan are straightforward and important:

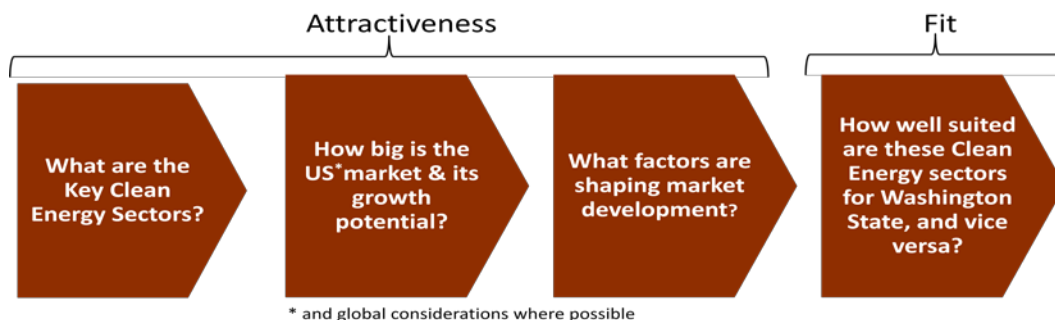
1. Washington is not a large state and it has limited financial and organizational resources to apply to the topic of clean energy job growth, despite the importance of this economic sector. Pursuing too many areas likely would result in failure in all efforts.
2. As described in more detail later in this report, this Leadership Plan is intended to be long-lived. The intent is that the focus of clean energy sectors will change over time, particularly as early successes are gained in the initial areas of focus.
3. The clean energy sectors selected for initial focus are still quite broad. The recommended sectors have many sub-components and have the potential for involvement and the formation of many clean energy businesses involved in the entire supply chain of clean energy solutions.
4. One of the key foundations for the Leadership Plan is to help create robust clean energy economic “clusters”. Successfully growing business in clean energy engineering, design, construction, installation, software and IT devices, legal services, financial services, marketing, training and education for an initial set of clean energy solution

areas builds a network of companies. When those companies are formed or expanded, the companies and individuals can then apply those skills and successful steps to other clean energy solutions and sectors. Success begets success, and a sustainable clean energy economic cluster is formed and grows.

The clean energy sector and many sub-segments of the clean energy markets identified broadly previously in Figure 1-1 in Chapter 1 of this report were evaluated to develop a short list. Factors considered included the size of the markets in the U.S. and internationally, the presence of capabilities in those sub-segments in Washington and the competitive fit of those capabilities by technology sub-segment. This process, depicted in Figure 3-1, is described in more detail in Appendix B. Figure 3-2 on the next page shows the result of this comparison.

Figure 3-1

Clean Energy Sector Evaluation Process



This comparative analysis of presence, competitive advantage and overall sub-segment attractiveness provided a basis for further assessment of the higher ranked opportunities. In addition, some of the sub-segments logically can be combined due to shared technologies, and shared skills and competencies to grow the sub-segment, among other factors described in the Phase I report by Navigant to the Council¹⁴.

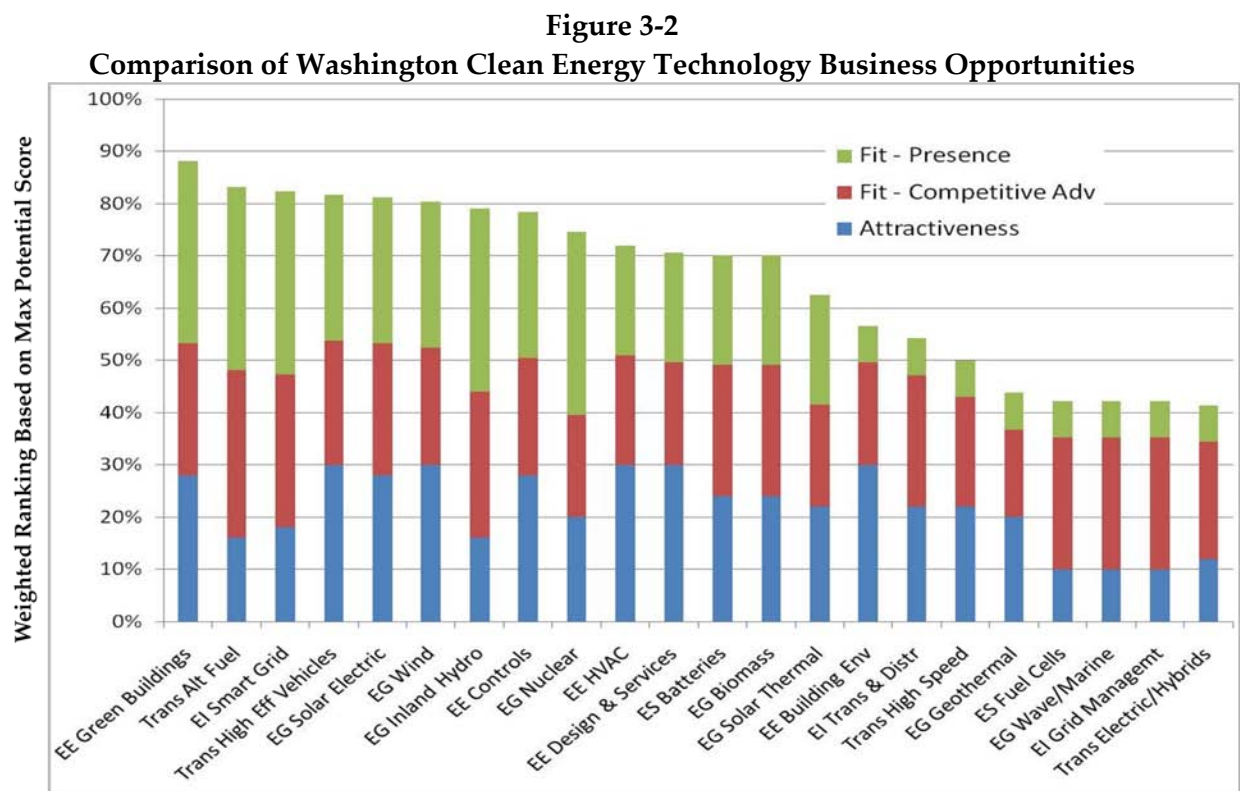
This screening, with the review and input of the Council, resulted in focusing on the following clean energy technology areas:

- » Energy Efficiency & Green Building;
- » Renewable Energy Resource Integration;
- » Smart Grid; and
- » Bioenergy.

¹⁴ Phase I: Washington State Clean Energy Technology Landscape, presented April 13, 2010, by Navigant Consulting, Inc.

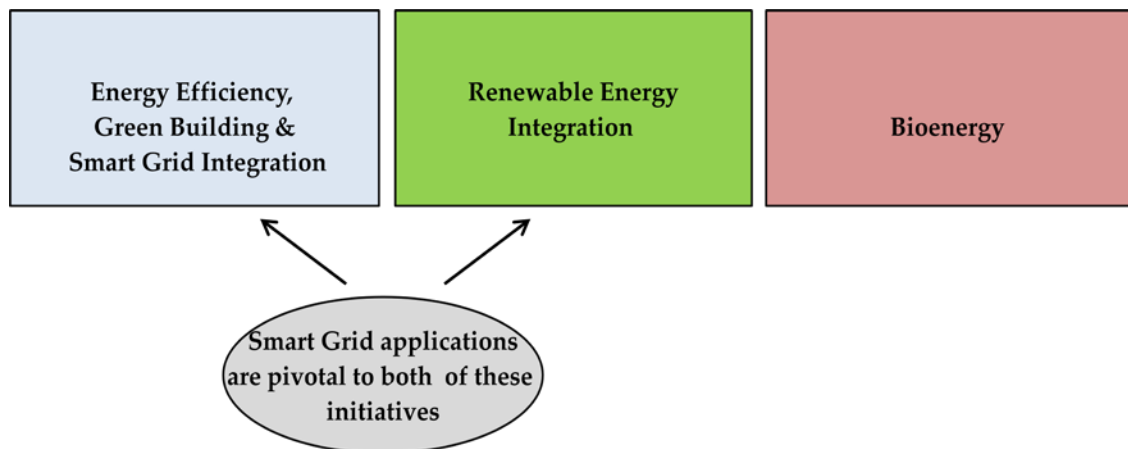
In addition, nuclear energy technology and high-efficiency vehicles were areas found to be of significant interest and potential future importance to Washington's economy. However, as described further in Appendix D, these technologies did not fit within the same type of criteria and strategy for economic development as the above areas. Pursuit of those technology segments are more appropriately pursued separately, and/or at a different time or venue.

A Focus on Integrated Clean Energy Solutions - These four clean energy technology areas were evaluated further to identify high-profile applications of clean energy technology where opportunities exist to demonstrate *integrated solutions* which, proven in Washington, can then be applied elsewhere. Four areas (energy efficiency/green buildings, renewable resource integration, smart grid and bioenergy) were selected for more detailed evaluation. Rather than treating smart grid technology as a fourth area unto itself, it is more efficient, and likely strategically more advantageous, to address smart grid as an enabling technology solution for other clean energy technology applications. Therefore, in selecting example clean energy technology integration opportunities, smart grid was combined with two other of the clean



energy segments: energy efficiency/green buildings and renewable energy resource integration, to result in three initial focus areas shown in Figure 3-3, below. See Appendix B for further description.

Figure 3-3
Focus Areas for Demonstrating Clean Energy Solution Integration

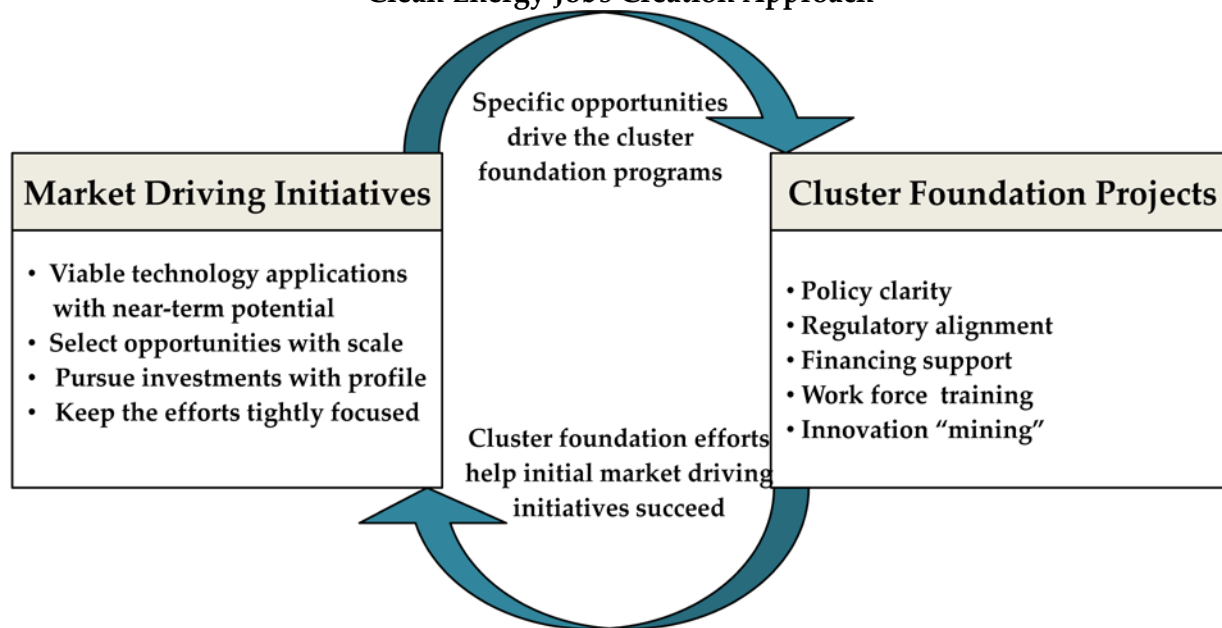


In each of these clean energy segments there are both commercially available technologies and solutions, and those that are still under research and development. The initial focus of the Clean Energy Leadership Plan is to focus on clean energy solutions in these areas which can advance through the *integration* of available or rapidly emerging technology to demonstrate new applications and opportunities. This is an important differentiator from some types of technology-driven economic development efforts. As explained in Chapter 2, the high level of competition among different states for clean energy business and jobs requires quick movement that demonstrates leading-edge solutions that can be deployed in the marketplace to support as broad a level of business and associated jobs as possible. The clean energy segments selected meet these criteria.

Chapter 4 – Two-Part Clean Energy Jobs Creation Approach

The foundation of the proposed Clean Energy Leadership Plan is a two-pronged approach that simultaneously implements focused *market driver initiatives* that deploy high-profile, leading-edge clean energy solutions in Washington while working among the supply chain and clean energy technology buyers to build a sustained economic cluster around clean energy in state. This is conceptually shown in Figure 4-1.

Figure 4-1
Clean Energy Jobs Creation Approach



The *market driver initiatives* and *Cluster Foundation Programs* are described below in terms of their specific objectives and how they “convene the marketplace” to achieve their goals. A Clean Energy Growth Partnership is proposed as the mechanism for implementing these strategic initiatives and programs upon adoption of the recommendations in this Leadership Plan. That “Partnership” organization and its key role in implementation of the Plan are described in Chapter 7 of this report.

Market Driver Initiatives Component Objective—Pull Innovation into the Economy: The fragmentation of the clean energy technology sector described in Chapter 2 requires the demonstration of clean energy solutions in a manner that sets examples for other similar opportunities. These are initiatives designed to use market forces to pull growth ahead in strategic clean energy markets. Bringing together buyers and suppliers in focused segments of the clean energy market and aligning *market-side* forces such as strategic policies and “road

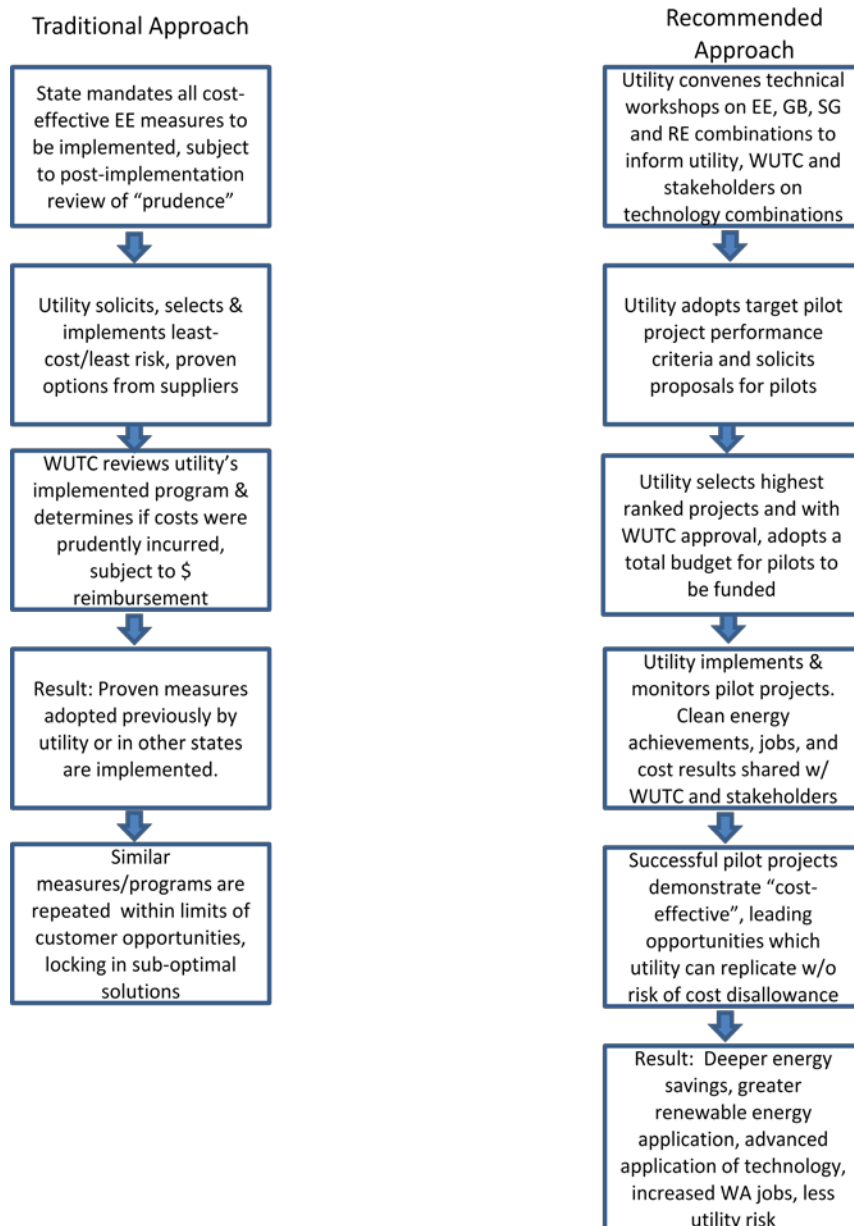
maps” for clean energy solutions in Washington State’s economy will accelerate clean energy job formation. By “convening” this market place, the major economic players in the state can target performance standards, regulations, procurement, R&D expenditures, and investment focused on specific clean energy solution outcomes.

While seemingly subtle, this is a major departure from the status quo of the interaction between buyers and sellers of clean energy solutions in Washington, or elsewhere. The example described in Chapter 2 of utilities selecting mainly known and proven energy efficiency measures to implement due to regulatory factors that place strong disincentives on demonstrating leading-edge energy efficiency solutions is illustrative of the change in process recommended in the Leadership Plan. Figure 4-2 compares the traditional approach of a utility procuring energy efficiency solutions deploying prior tried and proven solutions to a method where the utility and building owner buyers work with energy efficiency solution providers to identify and implement leading-edge solutions which gain market attention and differentiate the Washington solution providers.

In this energy efficiency example, the projects would be leading-edge solutions at large scale buildings or in smaller sets of applications perhaps in clean energy “districts” (new or retrofit) in which combinations of energy efficiency, green building, smart grid, and renewable energy supply applications at the local utility distribution and “customer side of the meter” are applied as a package. That “package” would be designed to achieve deeper actual energy savings, more reliably maintained in a manner that provides long-term suitable performance at levels greater than that achieved historically. To determine what is “leading-edge” and presumed feasible, buyers (e.g. utilities and building owners) in collaboration with clean energy solution providers (green building designers/green building developers, energy efficiency equipment providers, distributed renewable energy suppliers, etc.) would be brought together to combine the pieces of a system that drives new energy savings achievements. This process of convening solution buyers and providers reveals how best to grow jobs through the subsequent implementation of similar solutions. This requires clarity about shared goals, cross-market collaborations, and a flexible regulatory environment.

Figure 4-2

Comparison of Energy Efficiency Procurement Approaches



Solicitations are prepared to competitively select anticipated "best in class" solutions to be developed and monitored for real-world results. State, and hopefully federal and other non-government foundation funding, is provided to defray a portion of the cost of the demonstration project. This latter ingredient must be included. Risk reduction funding brings

the participants together to design and implement the technology solution(s). The results of the demonstration project are shared broadly and are used to inform policy makers, and other prospective buyers and providers of solutions of the performance and the costs.

These market driving initiative, leading-edge pilot/demonstration projects can be structured to be large enough or sufficiently high-profile to provide validity of performance and cost without being so large that if they do not perform as expected that it results in an undue cost burden to rate payers. If the projects perform as expected, they are, by definition, cost-effective, establishing a basis for similar such applications to be undertaken more broadly and sustainably. Rather than focusing on yesterday's proven solutions, this process drives new, best in class solutions in a way that differentiates Washington companies and employees. This enables the delivery of similar solutions outside the state's borders, growing even more clean energy jobs in Washington. This same approach can be applied to the other clean energy segments initially selected for attention in the Leadership Plan.

Overview of Recommended Market Driver Initiatives – The Council and Navigant have defined three near-term market driver initiatives designed to pull three major areas of economic opportunity in clean energy to a scale or level of leadership that will enable them to serve out-of-state markets that are or will soon be seeking these same solutions. These three initiatives share the strategy of deploying combinations of clean energy technology in an integrated manner in high-profile and near-term customer applications at reasonable scale and demonstrating leading-edge solutions:

- » **Combined Energy Efficiency, Green Buildings and Smart Grid Projects:** Provide proof of concept by accelerating adoption of advanced green and integrated energy efficient building design and implementation for new buildings and for retrofit, integrating smart grid applications at the utility distribution and retail customer level at a reasonable scale. Achieving this will stimulate development and deployment of Washington-based energy efficiency solutions for the continuum of building materials and energy efficient devices, designs and systems that demonstrate technology integration that can be deployed within and outside Washington. Opportunities for deploying such solutions could be standalone buildings, but would likely be more successful and demonstrate more leading-edge achievement if applied in some form of “clean energy district” or large campus type environment (government or commercial) where a broad range of energy efficiency, green building and smart grid applications could be combined, perhaps including customer-located renewable energy resources as well.
- » **Renewable Energy Resource Optimization and Smart Grid Deployment:** Enabling renewable energy generation, beginning with wind energy, to be integrated systematically into the grid in Washington State and the Pacific Northwest so that intermittency (variability in daily and hourly energy generation) is both technically and

financially balanced is a solution needed in Washington and the Northwest. In addition, advances in smart grid technology at the utility and regional transmission level to better utilize and deliver renewable and traditional energy supplies over existing electric transmission lines will help renewable energy resources such as wind and solar be more cost-effectively delivered to purchasers within the northwest region and potentially for deliveries to California as well.

Energy storage, smart grid and improved renewable energy production forecasting tools can all contribute to this solution. This need is expected to branch into other regions as well as they increase their penetration of renewable energy resources whose operations vary significantly over time. In-state contributors to solutions for wind energy integration will gain access to solutions and service outside of Washington after demonstrating solutions here. Achieving this will demonstrate new system integration solutions that can be applied outside Washington's borders. As a second jobs benefit, proof of successful deployment of such system integration solutions can enable growth within Washington in wind projects (initially) as well as other renewable energy generation on a cost-effective basis to help contribute to clean energy jobs in state. This initiative will also stimulate growth of smart grid software and operational solutions that have a growing global marketplace.

- » **Bioenergy Deployment Acceleration:** Biomass resources can provide energy in the form of transportation fuel as well as a fuel for power generation. This initiative accelerates the deployment of biofuels that are in early commercial application for aviation and military uses as "early mover" applications to integrate biofuel into the transportation fuel sector. In parallel, this initiative would enhance opportunity for accelerated high-efficiency application of biomass power generation. The combination of these biomass feedstock applications would expand businesses and jobs in energy production from forest and agricultural feed stocks and accelerate integration of technologies for biomass feed stock growth, harvest, transport, and fuel conversion. By demonstrating these renewable energy applications in Washington there can be some growth in in-state development, but more importantly could position Washington companies to provide bioenergy technologies and system solutions out of state to grow clean energy businesses and jobs on a sustained basis.

The scope and steps to be taken in implementing these market driver initiatives are described in more detail in Appendix A.

Convening the Marketplace— Enabling Market Driver Initiatives to Work: This approach to accelerating clean energy technology-related economic expansion goes far beyond the adoption of goals, policies and clean energy resource mandates. The three market driver initiatives described above will each bring together players in the marketplace to decide how policies and practices can induce strategic clean energy solution market growth. The participants in each

initiative will be the major market-*pull* organizations (such as state agencies, utilities, commercial and governmental building developers and owners, transportation fuel users and the like). Market driver initiative participants will also include technology enterprises in clean technology, and their suppliers of services, solutions and component products. Similarly, key public and private providers of market- *push* or support capacity will simultaneously need to provide input to grow and sustain these initiatives through activities, such as research, finance and education/training and marketing.

These market-pull and push partners will collaboratively plan well-defined, market-focused, *packages* of actions. Each of these initiatives will be designed to pull and push Washington-based clean energy solution development and deployment to market scale-up.

Energy Cluster Foundation Projects Component

The other half of the recommended Leadership plan is to create and sustain efforts to build a clean energy economic “cluster” among the supply chain and value chain of clean energy business in Washington. As noted in Chapter 1, the clean energy sector of the economy is in its formative stages globally, and Washington is not yet a leader in that formation. Building a clean energy cluster in Washington State faces fundamental challenges in forming new enterprises, expanding existing businesses, and attracting new industry. Clean energy companies may need new ideas, investment, skilled team members, and marketing. The market driver initiatives are a key part of the recommended Leadership Plan, but there are generic economic cluster development actions needed to provide a lasting foundation for a clean energy sector business cluster to form and grow in Washington. As Figure 4-1 earlier in this Chapter depicts, these two components – the market driver initiatives, and the cluster foundation projects, work in tandem.

“Cluster Foundation Projects” are about improving or creating a specific economic input component, which have been proven to influence where clustering of economic activity and growth takes place. To convene the clean energy marketplace in Washington, programs will be organized around specific sets of participating input providers and clean energy solution users, as outlined below:

- » **Policy and Regulatory Alignment:** As is described in more detail in Chapter 5, aligning clean energy policy with applicable regulatory requirements that influence the success of clean energy solution deployment is a key to creating clean energy jobs. Buyers and providers of clean energy solutions who participate in the market driver initiatives have first-hand experience in mismatches between clean energy policy and regulations that constrain timely, cost-effective or innovative deployment of clean energy solutions. Convening those buyers and sellers through the Market Driver Initiative process will enable focus on those regulatory and policy alignments needed to allow clean energy businesses and jobs in Washington to

grow. As noted in Chapter 2, the formation of a clean energy regulatory and policy oversight office (or a senior energy advisor) to help align regulatory processes and clean energy policy will help accelerate clean energy job growth.

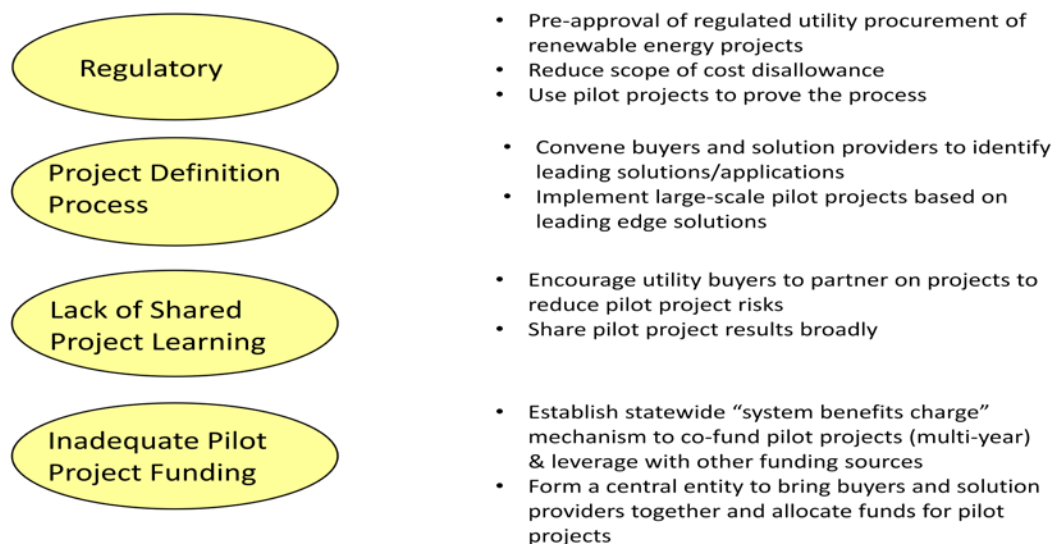
- » **Innovation:** Universities, national laboratories, and institutes as well as technology vendors, and technology commercialization experts will work with groups of clean energy technology companies to better learn where innovation is needed and to negotiate agreements on how to collaborate to accomplish deliveries of new ideas and enable their commercialization and sustainable integration into Washington-based industry.
- » **Finance:** State economic development agencies, financial programs, angel funds, venture funds, investment bankers, corporate venture funds will be convened with groups of newly formed and existing clean energy technology companies to collaborate on clean energy economy growth. These parties can help determine how to improve the readiness of clean energy technology deals, educate investors, and obtain seed capital as well as private equity investment in expansion or scale-up projects.
- » **Human Resources:** Washington State's workforce agencies, community colleges, specific university undergraduate and graduate programs , as well as private employment agencies, will work with groups of clean energy companies to appraise near-term and longer-term demand for specific skills and determine how best to align existing training or degree programs as well as recruit needed technical and management talent.
- » **Marketing:** Washington State's Department of Commerce, marketing vendors and intra-state regional economic development and marketing programs will work with clean energy companies to understand their product/service development packaging needs, marketing and distribution challenges, supply-chain development opportunities and branding. More importantly, successes of the market driver initiatives will be presented in effective outreach programs to make prospective regional and global buyers of Washington-based clean energy solutions aware of this in-state capability to enhance the market for in-state businesses' clean energy solutions to increase related job growth.

Chapter 5 – Recommended Clean Energy Leadership Action Plans

The proposed Leadership Plan will implement the two major components described in Chapter 4 using Action Plans to achieve the solutions summarized in Figure 5-1.

Figure 5-1

Summary of Proposed Leadership Plan Solutions



The recommended action plans are:

- » **Action Plan 1: Align Clean Energy Policy and Regulation** - Align regulatory practice with clean energy policies that support, rather than constrain, clean energy business and job growth in Washington;
- » **Action Plan 2: Accelerate High-Profile Clean Energy Solution Deployment** - Organize and partially fund leading-edge clean energy pilot projects to demonstrate new paths forward that showcase Washington innovation, resources and skills as a means to expand clean energy business in Washington as a platform to serve out-of-state markets; and
- » **Action Plan 3: Create a Focal Point for Clean Energy Economic Development** - Form and operate a clean energy leadership organization to:
 - Manage the market driver initiatives; and

- Help create economic “clusters” that will build and sustain long-term growth in clean energy business and associated jobs to successfully compete with other states and nations.

Action Plan 1: Align Clean Energy Policy and Regulation -- Alignment of regulatory requirements and clean energy policy is key to growing clean energy jobs in Washington. First and foremost, Washington needs to establish a clear and durable public policy supporting clean energy business growth to provide the foundation for economic regulation that supports demonstration of clean energy solutions that will feed that growth. As noted in Chapter 2, a single point organization (or person) within State government to act as a senior energy advisor and in part as a “clean energy policy ombudsman” preferably in the Governor’s office is a key first step towards regulatory alignment. As part of this function, this advisor could monitor and facilitate action on clean energy policy and regulatory alignment. Most leading states in clean energy have a clear point of contact on these issues. Washington could advance the prospects for clean energy economic growth by, at a minimum, having a person singularly responsible for interaction on energy issues in State government.

Specific areas of regulatory change which would enhance clean energy economic growth in Washington include, but are not limited to unambiguously authorizing by law the WUTC to:

- » *Provide greatly increased assurance of utility recovery of investment in or expenditures for clean energy measures and programs that support the State’s clean energy policy objectives. Better balance is needed between the obligation of regulated utilities to implement “all cost-effective” energy efficiency and to meet RPS requirements and the risk of disallowance of expenditures. The WUTC has initiated a proceeding to evaluate regulatory treatment for renewable energy resources and a similar proceeding for conservation incentives.¹⁵ These proceedings could give specific consideration to the use of leading-edge demonstration projects in renewable energy integration, bioenergy power or fuel production and combined energy efficiency/green building/smart grid solutions as contemplated in this Leadership Plan as a means to inform regulatory policy on these topics. Use of the market driver initiatives described in this Leadership Plan are a direct means of reducing uncertainty of risk of investment or expenditure on renewable energy and energy efficiency by regulated utilities, while providing balance in protecting ratepayer cost exposure.*
- » *Amend utility rate structures to avoid disincentives to utilities for successfully implementing energy efficiency programs (so-called “decoupling” rate structures). The WUTC’s on-going inquiry on conservation incentives includes the topic of decoupling¹⁶.*

¹⁵ UTC Docket UE-100849 – Inquiry on Regulatory Treatment for Renewable Energy Resources and UTC Docket U-100522 for Inquiry on Conservation Incentives

¹⁶ Ibid

This topic should be actively pursued to determine whether legislative changes are required or if administrative action can be taken by the WUTC to reduce this barrier to deploying leading-edge energy efficiency solutions that create clean energy jobs in Washington.

- » *Create incentives* to meet or exceed renewable energy and cost-effective energy efficiency targets. The market driver initiatives recommended in this Leadership Plan include the prospect of accelerating the demonstration and deployment of renewable energy and cost-effective energy efficiency. The implementation by regulated utilities of limited numbers of demonstration projects for leading-edge clean energy technologies likely would not likely create meaningful rate pressure for retail customers. In contrast, the risk of disallowance of costs for moving beyond current RPS requirements, or demonstrating higher efficiency and somewhat higher cost energy efficiency measures could preclude regulated utilities from pursuing even modest demonstration projects. If the larger regulated utilities do not pursue such demonstration projects, it makes it less likely that public power utilities would either.
- » *Encourage and enable the regulated, investor-owned utilities to partner with public power utilities* and similarly incent the public power utilities to collaborate and share in renewable energy, energy efficiency and smart grid large scale pilot projects to share in the investment. Such sharing would reduce risks, and share in the informative results of such pilot projects to benefit all retail customers in Washington. This collaborative effort will also enhance the platform for in-state clean energy solutions to more quickly access out-of-state markets. Reducing the risk of disallowance of at least the regulated utilities' share of potential joint market driver initiative demonstration projects would make it more likely that investor-owned and public power utilities could partner to achieve economies of scale and shared learning from the demonstration projects. Bonneville could also be a partner on such projects.
- » *Reduce barriers* in siting and permitting bioenergy, wind, solar, and other renewable energy facilities that are otherwise aligned with clean energy policy. Renewable facilities require numerous federal, state and local land use, permitting and operating permit approvals. For developing technologies and innovative solutions, these requirements can be particularly burdensome. Facilitation and coordination of regulatory and permitting approvals can greatly reduce the time to bring demonstration projects on-line, creating jobs sooner, and enhancing the prospects for success.

Action Plan 2: Accelerate Clean Energy Development via Market Driver Initiatives - Efforts by other states and other nations to be leaders in this new sector of the economy means that

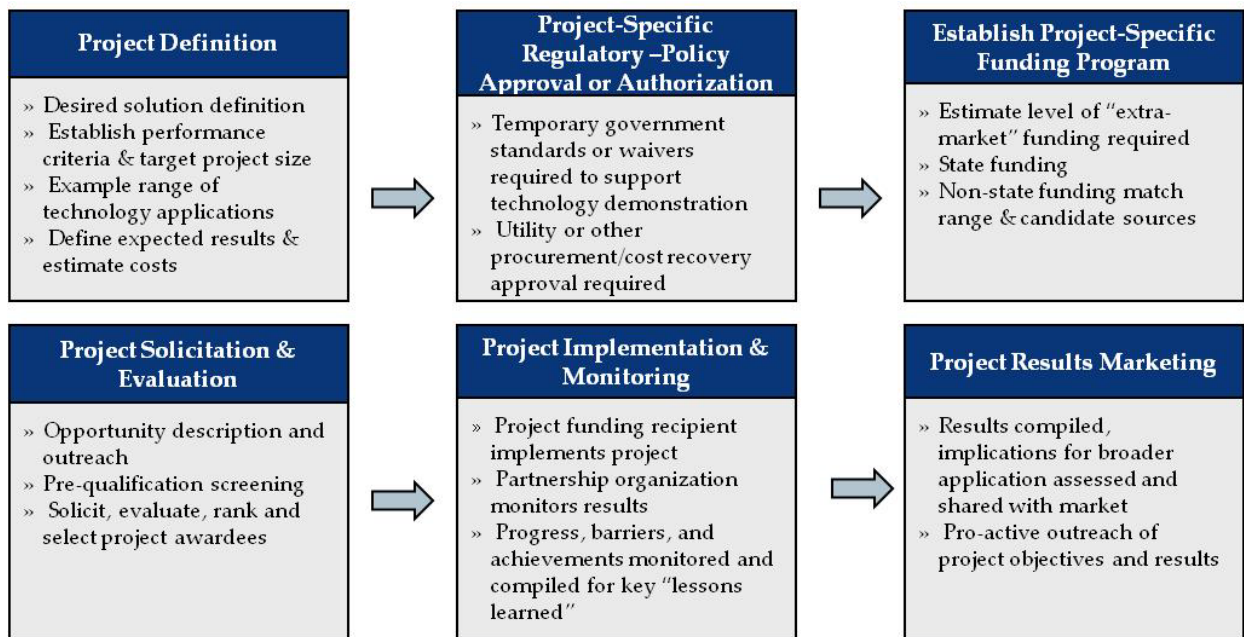
Washington must emphasize actions that can move clean energy technology applications that can be deployed quickly. Rapid deployment of leading-edge demonstration projects within Washington will lead to opportunities for Washington-based companies to grow to deploy similar clean energy solutions out of state. This action plan “pulls” demand for clean energy jobs. The market driver initiatives are directly focused on this objective. Specific areas of change which would enhance clean energy economic growth in Washington include, but are not limited to:

- » Target clean energy solutions which can leverage the circumstances, resources, skills and capabilities in Washington critical to creating job and business growth in clean energy. The selection of the target clean energy sectors described in Chapter 3 should ensure that the clean energy solutions that are pursued will meet this objective.
- » In implementing market driver initiatives, adopt minimum performance criteria and use the competitive market to identify and fund the most cost-effective energy efficiency, renewable energy integration, or smart grid solution. This competitive process pushes the envelope and differentiates Washington companies in the market to support job growth.
- » Pursue development of new clean energy solutions which can be deployed in the short-term – the next three to five years. The market driver initiatives will identify clean energy solutions in each of the three target clean energy segments using a process such as that shown below in Figure 5-2. By “convening the market” of clean energy solution buyers and solution providers using this type of process, leading-edge projects that can be developed and proven in three to five years will create new jobs more quickly.
- » Keep the focus of areas to pursue narrow enough to avoid diluting available in-state leadership and financial resources. There will be limitations of funding that will likely limit the pursuit of too many concurrent demonstration projects. Proper screening and prioritizing of projects using the process summarized in Figure 5-2 will allow informed selection of the areas to pursue and the priority of projects to undertake within financial limitations.

The recommended approach accelerates the use of existing clean energy technologies in new ways rather than focusing first on years of new research for a future potential solution. This creates more jobs along the supply chain of clean energy implementation more quickly and more broadly, without undermining clean energy research.

Figure 5-2

Market Driver Initiative Implementation Actions



The process shown in Figure 5-2 is a material difference from how the utility and building industry pursues clean energy solutions today in Washington, and in most states. Beginning with the upper left-hand box of this diagram, this process starts out differently than pursuing the most low-risk clean energy solution option. The goal in this process is to set a high, but attainable bar in developing either new energy efficiency/green building projects and programs or new programs to better integrate renewable energy. A minimum performance target should be set based on what the suppliers of clean energy solutions believe they can achieve within a price level the buyers find commercially viable. This “dialogue” between suppliers and buyers does not typically happen in today’s market.

Using the market driver initiative process, leading-edge projects would be competitively selected based on a combination of the lowest “energy utilization index” and the highest renewable energy utilization percentage within a range of costs that are deemed acceptable. Some new clean energy solutions can be more costly, particularly in a demonstration mode. Therefore, some level of partial cost subsidy can be needed for the most promising, “next generation” energy efficiency or renewable energy projects or programs. The goal is to use the market driver initiative process to demonstrate projects such that upon their completion and demonstrated performance, they show the viability of new combinations of clean energy solutions which can then be deployed more broadly in the market on a commercial basis

without future subsidy. In so doing, a new market “standard” is set, and Washington companies and employees become known for setting that new market standard and delivering solutions that meet it on a commercial basis.

Partnering with Bonneville Power Administration on Regional Solutions – Bonneville has been an active player in the energy efficiency market for decades. As part of the Market Driver Initiative program implementation, Bonneville could be a significant partner and player in identifying clean energy solutions of interest to Bonneville and its customers and in being a co-funding and implementation participant. Including Bonneville as a co-participant can add scale to demonstration projects. In addition, through its participation, Bonneville could help facilitate the participation of its wholesale power customers. Bonneville’s participation could also enhance the shared knowledge of the commercial successes of the market driver initiative projects.

Value of Market Driver Initiatives for Research and Innovation – The market driver initiatives are focused on implementing and integrating various clean energy technologies into commercial operating solutions to help fast-track the demonstrated commercial viability of leading-edge solutions. This focus, however, also supports earlier stage clean energy technology research in Washington. Successful acceleration of the integration of clean energy solutions into the operating environment acts as a draw or a *pull* for other clean energy technology research. Success of technology integration and use in Washington, by Washington companies and their employees provides market attention to the achievements of clean energy in Washington. Successful implementation will bring demand for more in-state research to be accelerated and more clean energy technology to be integrated into operating solutions.

This latter relationship between deploying solutions and advancing research efforts is specifically targeted, as an example, for the bioenergy market driver initiative. That initiative includes near-term project efforts for aviation and military transportation fuels and high-efficiency biomass power generation. Success in Washington with both of these initiatives would be augmented by the recommended actions as part of that Initiative to accelerate the development of larger scale bio refineries to develop combined energy and high-value non-energy products from biofuel processing at the research level as described in more detail in the Biofuels Initiative described in Appendix A.

Action Plan 3 – Create a Focal Point for Clean Energy Economic Development – Clean Energy Growth Partnership Organization Formation -- Creating a sustained clean energy competitive advantage for Washington state requires continuous focus to reduce market fragmentation, reduce regulatory friction and increase the odds for success in clean energy sectors that can create jobs in Washington. To this end, the State should form an organization dedicated to building clean energy economic “clusters” in ways that augment existing economic development organizations. A small, focused joint industry and governmental organization can accelerate the implementation of clean energy technology in a manner that brings buyers

and providers of clean energy solutions together. This same combined industry and government organization can also identify the need for actions to build and grow clean energy economic clusters in Washington to address issues such as:

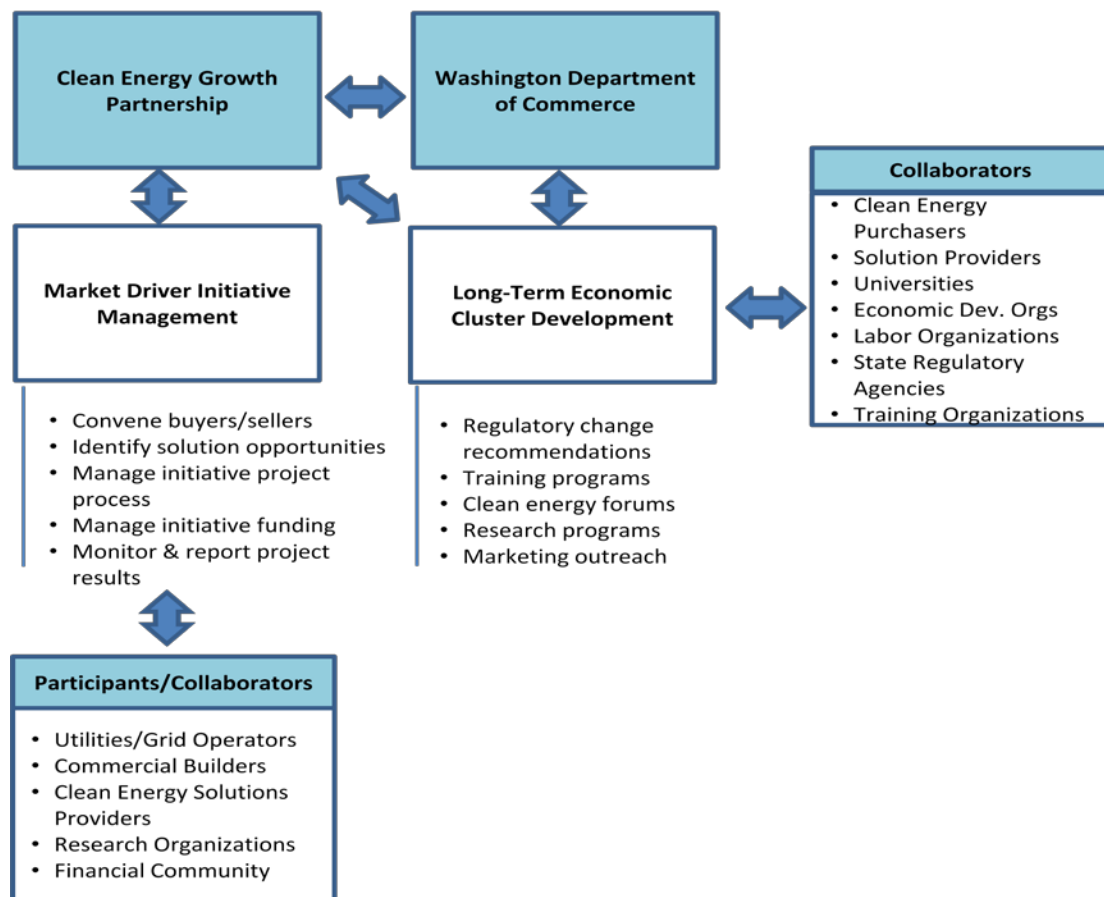
- » Energy policy -regulatory alignment;
- » Financial resources;
- » Required innovation improvement; and
- » Work force training.

The approach to creating such a central clean energy growth organization, a recommended structure and its function are covered in Chapter 6.

Chapter 6 – Clean Energy Growth Partnership

A Clean Energy Growth Partnership (Partnership) organization is proposed to advance the mission and objectives of the Clean Energy Leadership Plan. The Partnership will be a combined industry and governmental participant organization that provides a focal point for clean energy business and job expansion in Washington. A leadership structure is proposed for this partnership that is crafted to bring together all sides of the marketplace to enable defining and negotiating clean energy technology development initiatives and programs. The proposed Partnership functional responsibilities would be as depicted in Figure 6-1.

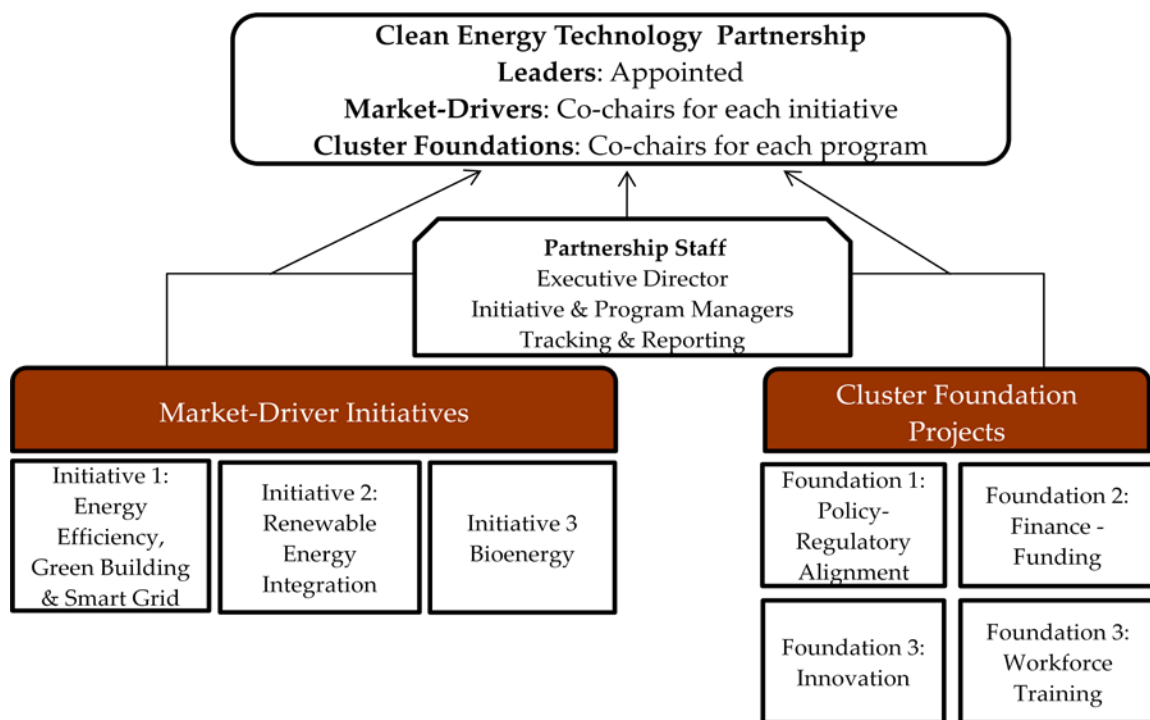
Figure 6-1
Clean Energy Growth Partnership
Functional Relationship



The Partnership would have the responsibility of managing the Clean Energy Leadership Plan actions described in Chapter 5. As shown on Figure 6-1, the Partnership responsibilities would include the responsibility of managing the market driver initiative selection recommendations, and monitoring of those initiatives. The Partnership would also collaborate with the Washington Department of Commerce and other economic development organizations in working with clean energy market participants to determine which clean energy economic cluster support activities, as discussed in Chapter 5, need to be undertaken or strengthened to better create sustained clean energy jobs in Washington.

Figure 6-2 shows the proposed structure of the Partnership. The Partnership includes an appointed governing board comprised of industry, solutions providers, buyers, directly involved government organizations, and research/training providers in the clean energy sector.

Figure 6-2



Members of the Partnership board would also serve on committees that guide the market driver initiatives and the Partnership's input to the clean energy cluster foundation projects. The Partnership board would be supported by a salaried executive director and a small staff of four to five full-time equivalent staff, of which some could be part-time, but all of whom would be well-versed in the clean energy sector. The professional staff could be augmented by retained technical and financial advisors along with retained or state legal staff on an as-needed basis.

Cluster Foundation Project Actions – In order to grow clean energy businesses and jobs in Washington State, the state must provide advantages in economic inputs that enable companies to more rapidly form and expand, as well as attract external partners and investors. Separately from the market driver initiatives, the clean energy economic cluster can grow by ensuring the alignment, responsiveness and creating of new advantages for each clean energy segment. To achieve these objectives, four Cluster Foundation Project working groups will be formed and managed by the Clean Energy Growth Partnership as shown previously on the illustrative Partnership organization chart on Figure 6-2. These working groups will have a broader focus than the market driver initiatives, and involve more narrowly-crafted projects between the producers of key economic inputs and their users—the clean energy cluster companies. This will create a dynamic structure that can follow through on implementation of the Leadership Plan.

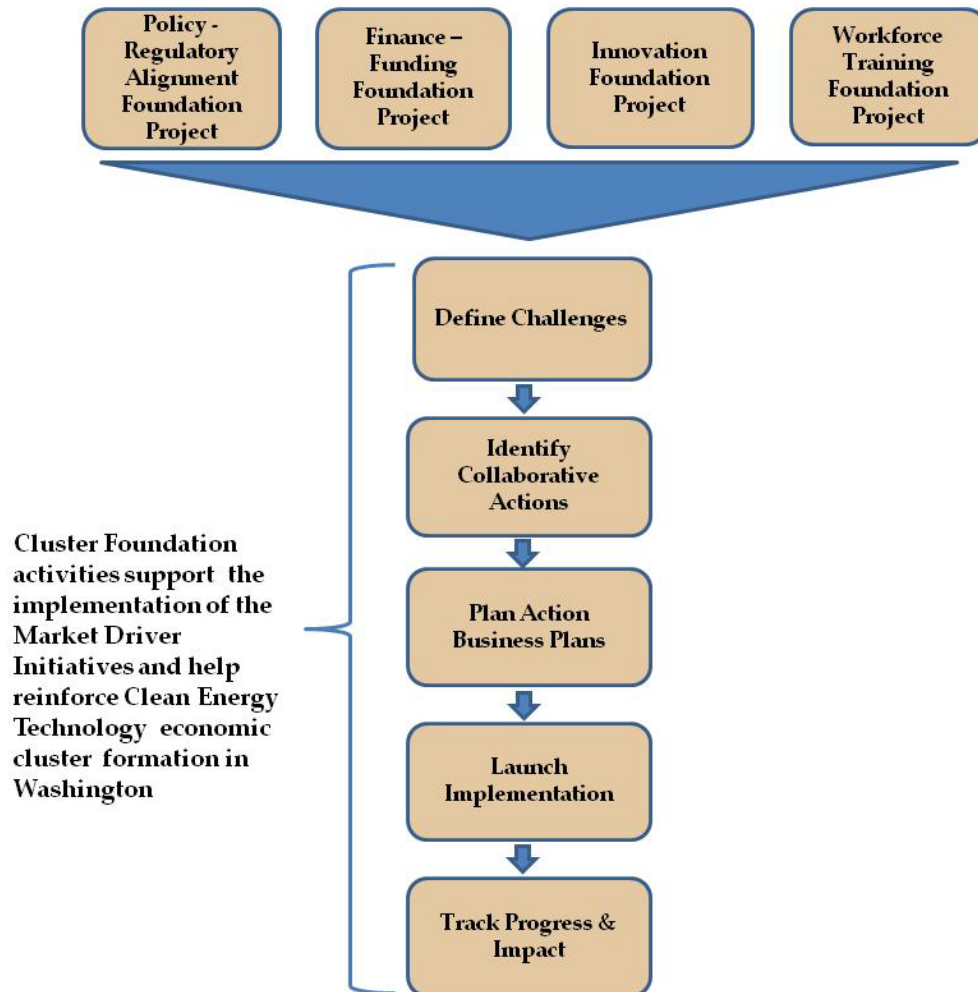
As shown on Figure 6-3 on the following page, to the extent necessary to help form a clean energy economic cluster in Washington to accelerate implementation of project and investment, the Partnership will convene key parties who are participants in Policy-Regulatory Alignment, Finance, Innovation and Workforce Training working groups that guide the cluster foundation projects.

These Working Groups will identify challenges and barriers to successful implementation of clean energy technology applications and implementation, working with active participants in the various parts of the supply chain and value chain in industry and government.

Coordination with Clean Energy Policy & Regulation Ombudsman – The Clean Energy Growth Partnership is not a regulatory advocacy organization. However, by managing the process whereby the market driver initiative projects are identified, solicited, evaluated, funded and monitored, the Partnership will obtain direct insight to those areas where there are conflicts between clean energy economic development and regulatory policies and practices. The Partnership can play an important role of informing the market and the government, via collaboration with a Clean Energy Policy & Regulation Ombudsman or senior energy advisor position in State government, as discussed in Chapter 2. That ombudsman/advisor is then in an excellent position to help facilitate changes to better align policy and regulation.

The annual administrative cost of operating the Partnership is estimated to be around \$1.75 to \$2 million. This amount excludes the leveraged funding to enable soliciting and undertaking the various market driver initiatives.

Figure 6-3
Cluster Foundation
Project Activities



Chapter 7– Funding Sources

The Clean Energy Growth Partnership is planned as an active organization that helps drive clean energy business and job expansion through bringing solution providers, buyers and government together to pursue specific targeted demonstration projects and programs. Active players in this market will not participate in the Partnership’s efforts to implement the Strategy without a strong reason. Sharing ideas and periodically convening to address issues of common interest will not bring true market players to the table or change their decisions on buying Washington company-provided clean energy solutions. Similarly, clean energy solution providers will not seek out participation in the Partnership’s market driver initiatives without a demonstrable benefit to do so.

As discussed in Chapter 2, and shown in summary form in Figure C-1 in Appendix C, other states have active programs and significant levels of associated funding for renewable energy, energy efficiency and some of the specific clean energy technology segments targeted in the recommended Washington Clean Energy Leadership Plan. To be recognized as serious about economic expansion through clean energy growth, Washington will need to dedicate funding that will meaningfully contribute to the implementation of targeted strategic clean energy market driver initiative projects and programs of the type described herein. Current State budget levels understandingly make such contributions a challenge. Funding of at least approximately \$20 million annually for these types of projects at the State level, with leverage of 1.5 to 2 times from other non-state government sources would be required for Washington to be seen as serious competitors to other states. Obtaining even greater state-sourced funding would provide quicker results. Having approximately \$20 million to leverage other funding sources with a 1 to 1.5 times match from combinations of federal, industry, and various foundation sources using the State contribution as a magnet for such non-State budget contributions would provide an annual market driver initiatives budget of \$40 million to \$50 million.

Absent such funding and a concerted effort to develop these “signature” market driver initiative projects, Washington is likely to continue to see exodus of clean energy companies to other states and nations. For example, the lack of in-state match funds at this level has resulted in numerous other federal matching grants being allocated to grantees in states other than Washington.

Absent having match funding sources at this annual level, efforts by other states as well as other nations with dedicated financial resources would likely significantly outpace Washington in clean energy business and job growth.

The adoption of a program for such funding is highly efficient. As explained earlier in this report, the monies that would be provided by the Clean Energy Growth Partnership would not be the total cost of the market driver initiatives. The objective of this funding is to provide only the increment needed to advance the commercial deployment of market-leading clean energy solutions. The foundation of such projects is that there is market recognition of the types of solutions and a market that pays for similar solutions now. That market can be commercial building owners or tenants, local government building owners, electric utility customers or buyers and users of transportation fuels. The Partnership funding provides the *increment* needed to prove up the next generation of clean energy solutions more quickly. Even the monies the Partnership derives from a state-created funding source are levered further by obtaining federal funding or foundation funding as a multiple of the funds the Partnership can garner via the state.

Once a project, or set of projects implemented by the Partnership are completed successfully, those successful projects are replicated fully on a commercial market basis. The Partnership can then move on to new clean energy solutions in Washington to help further build out the platform of clean energy business and job growth. This is a funding-efficient process that limits the obligation of state funding to help create clean energy jobs.

Potential Alternative and Recommended Partnership Funding Sources

There are multiple sources of funding that could be considered for sources to provide the State component of the above described matching fund mechanism to support the market driver initiative projects of the Clean Energy Growth Partnership. Options include, but are not limited to:

- » Redirecting existing economic development budget monies set aside for purposes other than clean energy-related job growth;
- » New legislative approval for budget allocation of State general fund monies;
- » So-called system benefits charges, often applied as hundredths of a cent per kilowatt hour (kWh) of retail electric sales;
- » Fees tied to sales of wholesale electricity from electric energy sources or suppliers inside Washington made to out-of-state purchasers (would require assessment of federal law limitations);
- » Fees applied per ton of carbon emissions from broad or selected sources to tie the funds so derived to the types of energy supply sources being replaced by clean energy technology applications; and
- » Fees applied to transportation fuels.

Several states have system benefits charges or “public benefit charges” applied to retail electric sales, some of which are listed in Appendix C. There are approximately 90,000 gigawatt hours (90 billion kWh) of annual retail electric sales in Washington State, including all types of electric utility ownership and governance. If a retail sales system benefit charge mechanism were used, for each 1/100th of a cent (\$0.0001) per average kWh of retail electric sales within the State’s boundaries, \$9 million annually would be collected. As an example, a system benefits charge of 2.5 one hundredths of a cent per kilowatt hour (\$0.00025/kWh) would yield over \$22 million annually to fund market driver initiatives and the Partnership’s operations. This would result in the typical residential customer paying approximately an extra \$0.20 or less per month on their electric utility bill. Of the above options, this funding source seems the most stable long-term and has the precedent of being used by other states who lead in clean energy economic activity. Many other options suffer from “start-stop” issues, governed by political winds and varying economic conditions.

The state of California established its “public benefit charge” of this type by legislation (Assembly Bill 1890) in 1998 as part of that state’s significant restructuring of the utility industry. Similarly, in 1997, Massachusetts, as part of its electricity market restructuring established an energy efficiency surcharge and a separate renewable energy surcharge that began at rates of 3.3 mills/kWh (\$0.0033/kWh) and 2.25 mills/kWh (\$0.00225/kWh), respectively, initially, then declining over different declining rates over a period of approximately 5 years. Both states have accrued funds for energy efficiency and renewable energy research and implementation on the order of \$50 million to over \$200 million annually using these funding mechanisms through adoption of state legislation.

If this source of funding was used in Washington, it has the benefit of a negligible monthly cost to the retail customer, with statewide job growth and associated economic benefits, along with reduced greenhouse gas emissions in Washington and elsewhere.

The estimated job growth benefits of the Leadership Plan with funding at the \$20 million level, leveraged by other non-state funds are described in Chapter 8. If a Massachusetts approach is used, there could initially be a higher level of funding for a few years to “jump start” the program, followed by lower “maintenance” levels in later years.

Chapter 8 – Plan Timeline & Expected Job Growth Outcomes

Timeline for Implementation

Figure 8-1 on the next page shows the timeline for activities required to start up the Clean Energy Growth Partnership and move forward to market driver initiative project scoping, solicitation, evaluation, funding and award. If the Partnership can be authorized in 2011, the first market driver initiative clean energy technology projects could be underway by the end of 2012 or early 2013. State funding sufficient to form and start operations of the Partnership could be obtained in 2012, and during 2012, funding arrangements for the project funding contribution by the State could be arranged, followed by obtaining non-State match monies. Under this schedule, State and match funds for the Projects could be available by 4th quarter 2012 in time to commence the recommended projects the following year.

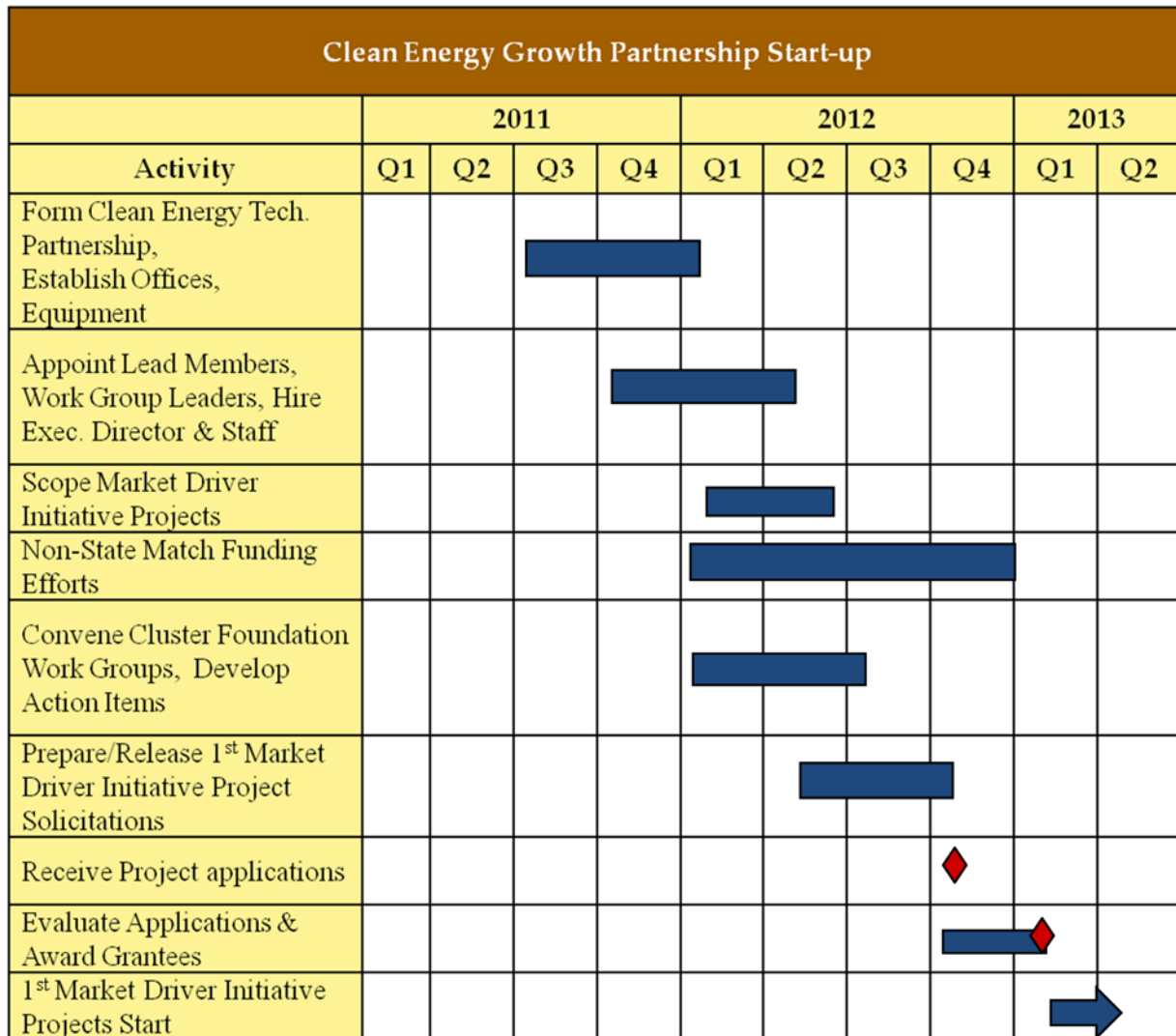
Based on this schedule, as early as 2013, leading-edge clean energy technology integration projects could be underway, such as:

- » Significant scale energy efficiency, green building and smart grid enabled commercial and/or government building projects demonstrating leading-edge energy savings;
- » Wind energy and energy storage integration project(s) providing balancing of in-state wind energy project output with various forms of energy storage and enhanced transmission system utilization;
- » High-efficiency biomass power generation; and
- » Biofuel supplies for aviation and/or in-state U.S. military transportation biofuel applications to demonstrate the ability to develop “bio refinery” biofuel production that produces a combination of commodity fuel and high-value non-fuel bio refinery products.

If the State portion of the market driver initiative projects begin receiving the approximately \$20 million annual funding beginning 2012, the first project awards could have two years of State funding, or \$40 million committed. If a 1.5 times match from federal, industry and foundation sources can be obtained, there could be \$100 million to apply to the initial round of market driver initiative projects by 2013.

As noted in the funding discussion in Chapter 7, it may be possible to redirect other state economic development efforts to focus on clean energy job growth as a higher priority. If such re-prioritizations were undertaken, it may be possible, administratively, to start some of the market driver initiative efforts earlier to help accelerate the Partnership’s programs.

Figure 8-1



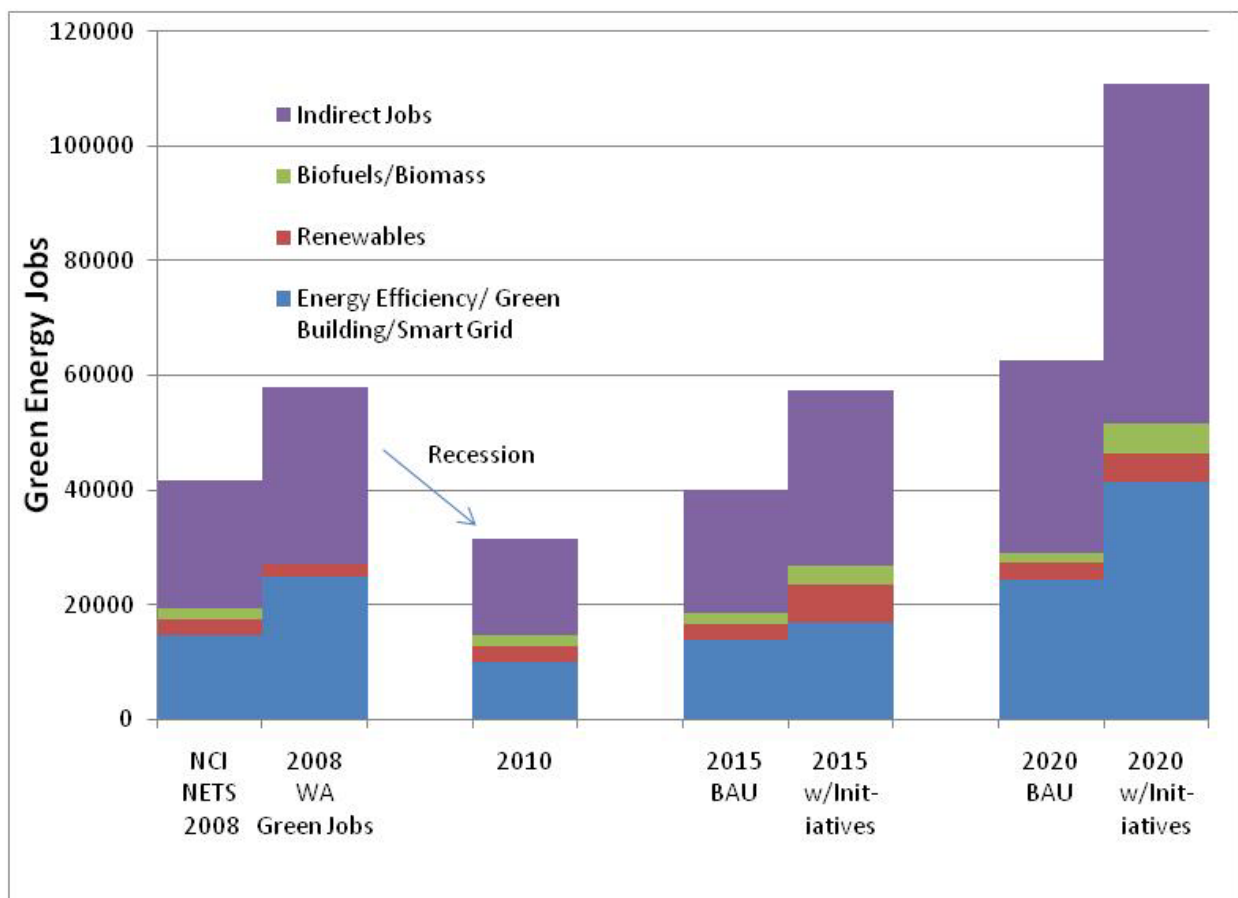
Job Growth Estimates

Based on the implementation schedule in Figure 8-1, actual implementation of the market driver initiative programs would likely begin in earnest in 2013. The job creation process is three steps. Initially some jobs start within the scope of the demonstration projects. More significant job growth begins with the implementation of similar projects to those leading-edge projects shown to be economically and technically proven in the market driver initiatives. A third phase of job growth begins when the in-state demonstration of leading-edge clean energy projects and programs are recognized by out-of-state buyers of these solutions, supplied in part by Washington companies and their employees.

Navigant prepared estimates of incremental job growth based on labor components of estimated energy efficiency/green building/smart grid project initiatives, renewable energy/energy storage/smart grid solutions, high efficiency biomass power projects and biofuel development. Consistent with the timeline in Figure 8-1, estimated job growth from present estimated levels by clean energy sector in 2010 is shown in 2015 and 2020, assuming there is \$20 million annually available from a systems benefit charge and one to two times leverage from federal and other funding sources. These estimated clean energy jobs are shown on Figure 8-2, depicting estimates based on “business as usual”, with no specific clean energy job program, compared to the estimated results from the Clean Energy Leadership Plan implementation (the “with initiatives” portion of the graph in Figure 8-2).

Figure 8-2

Estimated Washington Clean Energy Job Growth



Based on these assumptions, Navigant estimates that compared to business as usual, the Clean Energy Leadership Plan could provide an incremental 25,000 direct clean energy jobs by 2020

and an even greater number of induced and indirect jobs for a total of over 50,000 incremental jobs resulting in nearly \$2.5 billion in annual earned income in 2010 dollars. Property tax, business taxes and other non-personal income economic benefits would be in addition to this level. This clean energy business platform would grow beyond this initial development period as Washington's clean energy business continues to expand outside the state's borders.

As shown on Figure 8-2, the largest job creation sector of the three major clean energy sectors evaluated is the energy efficiency/green building area. Renewable energy shows a significant mid-decade growth effort with assumed increase in in-state incremental wind energy development enabled by the development of energy storage and enhanced transmission delivery capability supported by smart grid applications. However, as the wind energy installation reaches an assumed peak, those jobs evolve into a lower wind energy O&M job market that is far less job intensive. Those construction level jobs are replaced in part with longer-term wind and solar energy integration solution jobs that serve markets outside Washington, but at a lower long-term increased job level.

The efforts by other states to seek to create clean energy job growth makes it highly unlikely that these clean energy job additions would occur absent a program such as the Clean Energy Leadership Plan.

Appendix A -Market Driver Initiative Description

Market driver initiatives are a key foundation of the Clean Energy Leadership Plan with a direct focus on creating clean energy jobs in Washington. As described in Chapter 4, three areas of market driver initiatives are recommended for initial focused attention by the Clean Energy Growth Partnership:

1. Combined Energy Efficiency, Green Building and Smart Grid Projects;
2. Renewable Energy Resource Integration Projects; and
3. Bioenergy Projects.

This Appendix describes representative project types for each of these clean energy segments covering:

- » Economic Objectives;
- » Strategic Opportunity;
- » Challenges;
- » Proposed Actions:
 - Regulatory
 - Logistics
- » Funding Sources & Levels; and
- » Economic Benefits.

These specific projects are representative only. The intent of the Leadership Plan is to “convene” clean energy solution providers and buyers of clean energy solutions to identify leading-edge project opportunities in these broad areas to receive partial funding from the Clean Energy Growth Partnership. The scope, timing, size and cost of market driver initiative projects would be determined by what buyers desire and clean energy solution providers can provide.

Increased total personal annual income, tax revenue and associated economic activity is a common goal of each of these initiatives.

Initiative 1: Combined Energy Efficiency, Green Building & Smart Grid Projects

Economic Objectives:

- » Demonstrate combinations of energy efficiency, green buildings and smart grid applications that achieve greater net energy savings than utilities and building owners/developers traditionally have implemented as a means to showcase Washington skills and capabilities to provide similar solutions within and outside Washington for in-state job growth.
- » Prove the cost-effectiveness of the combined technology solutions to provide long-term savings to Washington utility customers. Use the demonstration projects for subsequent building projects to adopt these solutions as market standards without future subsidy.
- » Create new and expand existing energy efficiency, green building and smart grid solution companies in Washington based on the results of these combined technology projects as examples of the next generation of deeper energy savings solutions.

Strategic Opportunity: Washington State can demonstrate leadership in the next generation of energy efficiency, green building and smart grid applications through bringing utilities, local governments, green builders, energy efficiency solution providers and smart grid¹⁷ solution providers together in a competitive, leading-edge, properly scaled demonstration project or set of projects. The most promising opportunities could involve “clean energy district” developments¹⁸. This approach will provide real-world application of combined technologies and applications in energy efficiency to inform utilities, commercial/governmental building owners, regulators, technology providers and financial players what can be achieved. The result will be implementation of sustainable, leading-edge energy savings opportunities that can be replicated in Washington as a new status quo to demonstrate viability of deeper savings for Washington utilities and customers while proving opportunities to be replicated for export to other out-of-state markets.

Current Challenges:

- » Coordination of Investment: Lack of targeted risk-sharing funding to bring solution providers and utilities together for shared utility purchaser and energy end-user benefit to prove market-leading solution performance.

¹⁷ Smart grid applications will focus on monitoring and feedback on energy customer end-use of energy in designated major end use to modify consumer/building owner-tenant behavior and optimize efficient use of energy saving features. Successful deployment demonstrates market value of Smart Grid at the utility distribution level

¹⁸Applying energy efficiency/green building/distribution level smart grid at various size and types of buildings with a designated boundary, new development, campus or commercial/government center, potentially in combination with distributed renewable energy or district heating/cooling systems

- » Need for Reduced Risk of Investment: Commercial building developers need demonstration of the cost of leading-edge energy efficiency/green building prior to committing to investment. State regulatory structure that includes WUTC retroactive review and potential disallowance of investment or expenditure by utilities chill initiative to push boundaries for market-leading energy efficiency/green building projects/measures.
- » Cost Recovery Risks: Present economic conditions also challenge commercial building owners from capturing return of added energy efficiency/green building costs in sales or lease payments. Utility rate structures that tie cost recovery largely to the volume of energy sold create a disincentive to higher energy efficiency savings. Lower energy sales result in under-recovery of costs when energy efficiency reduces volume of energy sold.

Proposed Actions

Regulatory Actions:

- » Improve Regulatory Certainty on Costs & Performance Requirements: Establish required legislative code modifications (or administrative actions) that:
 - Allow pre-approval of authorized project/program expenditure by regulated utilities that are designed to meet performance targets proven by commercial scale and independently measured demonstration projects.
 - Use the market driver initiative projects to set general performance expectations for broader implementation within total authorized utility budget level expenditures.
 - Eliminate retroactive disallowance of funds spent other than for specific improper management. Use program evaluation of Initiative projects to guide future investment/expenditure authorizations as a substitute for retroactive disallowance.
- » Eliminate Electric Rate Structures with Energy Efficiency Disincentives: Accelerate the on-going WUTC utility rate “decoupling” inquiry proceeding to implement rate structures that do not create energy sales volume reduction disincentives.¹⁹

¹⁹ The WUTC presently has an open proceeding evaluating incentives for renewable energy and energy efficiency measures, of which “decoupling” of rates to eliminate disincentives for energy efficiency due to rates being tied to volume of energy sold. RCW 80.28.260(2) provides latitude for such adoption.

Logistical Actions:

- » Use Market Players to Define Leading-Edge Demonstration Projects: Work with utilities and building owners/developers to establish target pilot project criteria, sizes, expected energy and cost savings and required funding levels.
- » Team Utilities and Green Building Owners/ Green Building Developers to Solicit Projects: Utilities work with the green building owner/green building developer sector to collaboratively solicit competitive appropriate scale and scope project proposals for shares of combined Partnership and other matched funding support to develop market-leading demonstration projects. Utilities solicit bids from energy efficiency/green building developers to seek Clean Energy Growth Partnership funding. Utilities could combine to share a demonstration project, or individual utilities and development partners could compete separately. The objective is to seek “best new practices” opportunities that best showcase Washington leading-edge opportunities.
- » Use Government as a Market Leading Purchaser – State government can be a market leader in selecting the solutions and standards developed as part of this market driver initiative to apply the next generation of energy efficiency and green building solution packages. Procurement efforts could be modified for targeted levels of demonstration projects to help provide proof of concept for this initiative for the government/public building sector.

Funding Sources & Amounts:

- » Funding Sources: Funded by a combination of utility energy efficiency/Smart Grid funding, commercial builder contribution to be recovered from real estate market (sales or lease \$), and combined matched Clean Energy Growth Partnership and funding collaborators monies. Local and municipal weatherization block grants could be an additional source of funding in cases where demonstration projects qualify for those funding sources.
- » Funding Amounts: Subject to utility and solution provider input, scale of individual projects could be individual or combined “clean energy zone/district” buildings in 100,000 to 1 million sq ft range requiring \$2.5 million to \$30 million per project “above market” funding, some share of which would be grant dollars from Clean Energy Growth Partnership²⁰. Smaller projects could also provide viable demonstration of these target solutions. Profile and proof of concept can be more important than scale in some building markets and applications.

²⁰ “above market” costs referring to amounts that may not be recoverable from combined building/development sales or lease payments and utility program investment/expenditure levels until the demonstration project has proven post-completion results

Economic Benefits:

- » **Near-term Job Growth:** Acceleration of construction jobs (including clean energy trades apprenticeships) from accelerated building development or retrofits that would not otherwise happen as quickly. Additional engineering, software, architecture, finance jobs from pilot projects and subsequent repeat projects enabled by successful pilot projects.
- » **Sustained Job Creation:** Create platform for continued cost-effective investment in energy efficiency, green building and associated Smart Grid deployment in Washington and associated business and job growth. Establish basis for similar services in Northwest region and outside the region based on leading-edge project deployment, experience and capabilities proven from successful in-state pilot projects.
- » **Increased Property-Tax Revenue:** Receipt of more property tax revenue in Washington to the extent demonstration projects show net value of higher total building investment to achieve deeper energy savings²¹

Initiative 2: Renewable Energy Optimization & Smart Grid Deployment

Economic Objectives:

- » Create businesses and jobs that support the integration of renewable energy into the transmission grid and the regional power supply.
- » Establish Washington-based businesses and jobs in distributed energy storage deployment that balances renewable energy time of day production with customer needs.
- » Lower the cost of energy in the region with more economic use of existing transmission system through smart grid applications that optimize delivery of energy on existing system.

Strategic Opportunity: Combine in-state renewable energy generation with energy storage and smart grid applications to demonstrate cost-effective integrated solutions to differentiate Washington-based clean energy solution providers in the market. Smart grid improvements in transmission and distribution delivery efficiency can more effectively utilize the existing transmission grid, allowing higher percentages of renewable to be utilized system-wide. New and unique energy storage solutions, including demand response solutions, could provide balancing or “firming” of intermittent generation sources (wind, solar, biomass, etc.), similarly allowing a higher percentage of intermittent renewable penetration system-wide. Wind (and in the future, solar) energy development in Washington is being undertaken to meet in-state I-

²¹ Incremental property tax revenue could be 10% to 20% per building over its commercial life, and could result in some construction occurring more quickly than status quo, resulting in earlier tax revenue

937 RPS requirements of Washington utilities. The ability of the system to cost-effectively incorporate a higher percentage of renewables that meet in-state and export markets would allow WA to be a leader, while demonstrating how best to integrate renewable energy into the regional power supply portfolio and grid operations.

Current Challenges:

- » Coordination of Investment: Lack of advance approval of renewable energy investment or power purchase commitment to meet I-937 RPS requirements and retroactive review of expenditures limits the amount of renewable energy regulated utilities in Washington can and will commit to deploy. Energy storage solutions which are likely needed to meet total I-937 targets will similarly need investment approval.
- » Risk of Investment: Investment in continued renewable energy, along with energy storage and smart grid technology deployment to integrate renewable resources faces new levels of uncertainty in regulated utility cost recover from the WUTC. Cost of “proof of concept” of energy storage for any one utility (regulated or public power) places undue burden on large scale demonstration of that technology.
- » Uncertainty of Operational Cost of Intermittent Renewable Energy: Concerns remain on the operational costs of wind energy in particular on the Northwest grid due to imbalance energy effects as the percentage of renewable energy resources in the region expands.²²
- » Limitations on Existing Transmission System: Operational limitations on existing transmission lines within the Northwest and between the Northwest and California constrain the amount of energy that can be exported until new transmission can be developed or existing transmission loading is optimized using smart grid technology. In addition, a similar financial/investment risk of WUTC denial of cost recovery is a barrier to developing transmission assets that can relieve present load constraints.

Proposed Actions

Regulatory Actions:

- » Renewable Energy Cost Recovery: Reduce the uncertainty of cost recovery for regulated utility renewable energy expenditure or investment cost recovery. Provide for regulated utilities to purchase or develop renewable energy and enable cost recovery within utility cost projections for approved levels of capacity without risk of retroactive disallowance of costs within allowed cost variance boundaries.²³

²² Imbalance energy effects refers to costs imposed on the grid to ramp non-wind generation up or down to compensate for variation in wind production from predicted levels and related operational adjustments

²³ Regulatory alignment is needed to warrant utility participation in the types of pilot project described herein.

- » Enable Smart Grid and Energy Storage Project Cost Recovery: Allow regulated utilities to participate in and recover their cost share of smart grid/renewable energy optimization pilot projects to demonstrate cost-effective means to:
 1. improve the availability of existing electric transmission capacity within Washington and to export renewable energy outside of Washington,
 2. improve inter-balancing area operations and coordination to reduce imbalance energy costs from wind energy,
 3. improve operational prediction of wind energy to reduce imbalance energy costs to the grid, and
 4. demonstrate the operational benefits and cost of alternative energy storage systems to store intermittent energy from wind and solar generation to better match customer time of use

Logistical Actions:

- » Build Utility Consensus on Renewable Energy Growth: Reach consensus of Washington utilities (investor-owned and public) and Bonneville Power Administration regarding levels of incremental wind and solar energy that can be developed to meet NW in-region needs and California export within the existing transmission system and available operational adjustments
- » Establish Renewable Energy Supply Optimization Systems/Tools: Define and implement an energy storage/wind forecasting/smart grid competitive solicitation with combined Clean Energy Growth Partnership, utility, Bonneville, U.S. DOE and non-profit foundation support for a pilot project
- » Show and Share Benefits of Renewable Optimization Project: Use interim results from existing DOE-funded transmission system optimization project²⁴ to identify additional benefit potential from energy storage, improved wind forecasting and power marketing mechanisms to optimize wind energy development and operation.
- » Launch an Integrated Pilot Renewable Energy Optimization Pilot: Define a combined wind energy operation, energy storage and transmission optimization program at a pilot level for implementation by 2012. Use multi-utility collaboration/participation approach, including involvement by Bonneville, to reduce cost and risk of the pilot project²⁵.

²⁴ Western Electricity Coordinating Council synchrophasor project funded by utilities, grid operators and U.S. DOE to improve transmission system operation to increase delivery capability over existing system and system reliability, total funding \$108 million

²⁵ Include public power and investor-owned utilities to gain greater market penetration and economic benefit

Funding Sources & Amounts:

- » Amount: Level to be defined based on size of pilot project deemed necessary. Likely undertaken on a phased basis at \$15 to \$25 million/yr total funding, with Clean Energy Growth Partnership participation in range of \$5 to \$8 million/yr.
- » Sources: Funded from recommended WA utilities system benefit charge proceeds with match from participating utilities, Bonneville, DOE and solicited foundation participation.

Economic Benefits:

- » Grid Interface: Formation and growth of engineering, software and planning jobs created to establish energy storage, wind energy forecasting and smart grid device and system development for the combined solution, at the pilot and long-term implementation stages
- » Energy Storage: Expansion of businesses providing energy storage installation and O&M services and software solution providers for communication and monitoring systems for the storage system function.
- » Renewable Energy Producers: Increased wind and solar energy generation facility planning, engineering, site preparation, installation and O&M enabled by the pilot project and subsequent enhanced development potential
- » Supply Chain: Formation of solutions businesses at existing or new companies in Washington for all of the above components of this combined energy storage, smart grid, transmission, distribution and wind and solar energy expansion solutions.

The Bioenergy Initiative is discussed in two segments as 3A and 3B.

Initiative #3A: High-Efficiency Biomass Power Initiative

Economic Objectives:

- » Create additional jobs in the forestry and agricultural sector to supply biofuels for transportation fuel and biomass for power generation
- » Establish and expand businesses and jobs in biomass power generation and biofuel production
- » Provide additional economic value for inputs to the forestry and agricultural sector in Washington to enhance those overall business sectors to stabilize and grow.

Strategic Opportunity: Expand Washington’s biomass power production capability using high-efficiency technologies to increase production and develop businesses and jobs to export technology and skills to out-of-state markets. Washington’s extensive forest-based and agricultural biomass feed stock can be a significant contributor to sustainable renewable power supply to add to the existing approximately 325 megawatt (MW) of existing in-state biomass power supply. Focused, competitive demonstration of high-efficiency biomass power production could add depth to renewable energy production in Washington. This expansion can create businesses, systems and practices in bio feedstock farming, harvest/restoration and transportation that could be equally applicable to future large scale biofuel industry success. Biomass power has applicability outside of Washington and in-state demonstration by Washington companies can build a platform for export of solutions.

Current Challenges:

- » **Uncertain Fuel Supply:** Concerns about competition between future biofuel production and combustion of biomass material for nearer-term biomass power creates uncertainty for biomass power development on a project-by-project basis.
- » **Uncertainty on Net Carbon Emissions:** Questions on the net carbon emission effects of biomass power production (from fuel harvest to power project operation) raise barriers to implementation.
- » **State Land Biomass Resource Contracting:** Difficulties in securing commercially viable rights to forest-based biomass feed stock from Washington Department of Natural Resources controlled lands and timber resources.
- » **Project Development Lead Time:** Lead-time and up-front investment required to demonstrate project viability creates challenges in ability to compete in renewable energy procurement windows.

Proposed Actions

Regulatory Actions:

- » Longer-Term Biomass Contracts: Washington Department of Natural Resources establishes long-term forest biomass harvest contract rights to better match life of biomass power projects (could apply equally to biofuel projects).
- » Less Onerous Facility Permitting Processes: Provide accelerated or coordinated facility permitting process for environmentally sensible biomass power projects competing for Clean Energy Growth Partnership pilot demonstration project programs (enhanced inter-agency coordination should be a long-term solution beyond demonstration projects). Regulatory approval provisions that recognize and encourage biomass power projects that demonstrate net carbon reduction, high efficiency use of biomass resources and environmentally-appropriate use of harvested, farmed, and/or available residual bio feedstock should be developed and applied.

Logistical Actions:

- » Competitive Project Solicitation Process: Work with utilities and biomass power suppliers to implement a competitive biomass power solicitation process for pilot high efficiency biomass power projects on a performance standard basis²⁶. Solicitation could be for siting, design and permitting support for larger projects or for a portion of capital cost for smaller projects. A sequencing solicitation for planning and design for multiple projects, followed by a competition for construction/production project(s) could be undertaken.
- » Establish Power Purchase Framework: Clean Energy Growth Partnership works with utilities to provide power purchase framework for successful project(s).
- » Share Pilot Project Results: Use cost, fuel efficiency and biomass feed stock results from pilot project to inform the market, resource agencies and stakeholders of viability of expanded biomass power generation

Funding Sources & Amounts

- » Sources: A combination of Clean Energy Growth Partnership, U.S. Dept of Energy, U.S. Dept of Agriculture and foundation funding could be used.
- » Amounts: Planning & design funding could be \$500,000 to \$2 million per project, project development funding could be \$1 million to \$10 million, of which Clean Energy Growth Leadership funding could be 1/3 of total.

²⁶ Establish fuel efficiency and net carbon targets

Economic Benefits:

- » Differentiating Washington Biomass Energy Businesses: Position Washington as the “next generation” biomass power supply technology design/implementation center to expand businesses and jobs.
- » Improve Overall Forest & Agriculture Economic Sector in Washington: Adding an energy value component to forest and agricultural production provides additional economic input to forest and agricultural production per acre, enhancing those industry sector job opportunities in Washington. Result is retaining existing sector jobs and creating more jobs in the sector.
- » Help Accelerate Biofuel Business: Biomass power planning and development, rather than compete with future biofuels for transportation, will further research and demonstration for feed stock growth, harvest/restoration and transportation. This demonstration will also be relevant to biofuel feed stock supply needs, reducing costs to that industry and helping job growth in both bioenergy segments.

Initiative 3B: Biofuel Refinery Demonstration Projects

Economic Objectives:

- » Use Washington’s Biofuel Industry Position to Create Jobs: Leverage Washington’s leadership in aviation biofuel commercialization efforts to gain global market recognition to foster additional biofuel development and associated business and job growth.
- » Leverage Military Presence to Demonstrate Biofuel Viability: Use Washington’s major military operations presence to demonstrate broader biofuel use to accelerate the state’s biofuel business and associated jobs.

Strategic Opportunity: Washington has significant biofuel research on-going through the Bioenergy State Laboratory (BESL) and private research and commercialization in biofuel, particularly for biobased aviation fuel. Acceleration of a broader range of transportation biofuels could be achieved through the development of a “biorefinery” which targets intermediate high-value non-energy products from biofuel conversion in a manner similar to that used in the traditional petrochemical industry. In addition, increased support for biobased aviation fuel commercialization and partnering with U.S. military facilities in Washington State to use those markets for transportation biofuel could accelerate biofuel commercialization and differentiate Washington biofuel companies, expanding in-state bioenergy jobs.

Current Challenges:

- » Coordination of Fragmented Biofuel Production Business: The biofuel development market is highly fragmented, with numerous biomass feed stock and end-uses of biofuels being sought by many parties, typically with limited capitalization. Focus of research has been on fuel only, largely due to funding sources at the federal level aimed at energy. Excluding intermediate chemical or other non-energy refinery products requires the lower value fuel commodity to fund the entire cost of research and ultimate efforts at commercial development.
- » Biofuel Facility Permitting Process: Biofuel production plants are in early stages of commercialization, with each plant typically being unique. This creates permitting challenges, with overlap among many state, local, and some federal agencies, burdening the development process for large scale prototype biofuel plants.

Proposed Actions

Regulatory Actions:

- » Permitting and Regulatory Approval Facilitation: Provide a single point in state government to help coordinate permitting processes among federal, state and local review agencies for demonstration and first commercial biofuel plants to reduce development risk, timelines and costs. This function is well suited for a Clean Energy Policy & Regulation Ombudsman or Senior Energy Advisor as described in Chapter 2 of this report.

Logistical Actions:

- » Structure a Biorefinery Design Solicitation: In collaboration with BESL, develop a solicitation for a facility design and program implementation for a “biorefinery” that focuses on refining high-value intermediate non-energy products along with biofuels to enhance commercial viability for biofuel production from a broader array of biofeed stocks.
- » State-Federal Collaboration for Military Transportation Biofuel Demonstration: Solicit U.S. military interest in a biorefinery program to include strategic alternative fuels for military transport purposes to be tested in U.S. military facilities in Washington State as a near-term biofuel test market.
- » State Government as Purchaser – Where possible without increasing costs, have State government be a market leading purchaser and user of in-state produced biofuel.

Funding Sources & Amounts:

- » Sources: Combination of Clean Energy Growth Partnership, U.S. Department of Defense (Navy or other), U.S. Department of Agriculture and U.S. Department of Energy funding for facility design parameters and program design under competitive solicitation for Washington-located firms. Subsequent phases would be for funding of project development for risk sharing of leading-edge projects.
- » Amounts: Level of funding is highly variable based on scale and complexity of projects. Funding is likely to be phased with design, followed by project development. Initial effort to define the facility requirements, preliminary design and program of research, including stakeholder input process likely to be in \$500,000 to \$750,000 level, with approximately 1/3 to 1/2 share from Clean Energy Growth Partnership funding. This effort would define the cost of implementing the biorefinery program to be funded out of a subsequent program effort. The initial “soft costs” of planning, specifying and designing a biorefinery project can be a major obstacle to move forward with the actual capital funding of project construction. The subsequent full biorefinery project specification and design phase could involve total project design funding (incremental to the developer’s contribution) in the range of \$3 million to \$10 million, with approximately 1/3 share coming from the Clean Energy Growth Partnership. Having Washington provide at least this design level funding can help differentiate the State from others in this sector.

Economic Benefits:

- » Differentiate Washington Biofuel Companies to Grow Businesses and Jobs: This commercialization acceleration research effort is a longer-term program than the other market driver initiatives. It will provide a continuum of biofuel development in Washington for biofuel programs that do not compete with food crops to establish Washington among the national leaders in biofuel development, market creation and commercialization. Business and jobs will be developed including primary research, facility design, field labor (agriculture and forestry), transportation, finance, marketing and operations.
- » Providing Additional Economic Input to Forest and Agricultural Economy: By creating energy and other biorefinery non-energy intermediate products, incremental sources of income are provided for the forest and agriculture economy in Washington to help vitalize those sectors.

- » Reinforce Washington's Military Operations Economic Ties: Attracting U.S. Department of Defense interest to a state-based transportation biofuel demonstration program can help accelerate funding and lever the strong presence of military facilities and fuel use here in Washington. This provides an additional tie between the major military operations in state as an additional means to foster the mutual economic support between U.S. military operations and Washington State.

Appendix B Process For Selection Of Clean Energy Segments

Objectives and Criteria

This appendix describes the process of how the market driving initiatives were derived, with the objective of finding the business segments and focal points that have the best chance of growing Washington State's economic triple bottom line -- businesses, jobs, and competitiveness. Navigant started from a consideration of the broader universe of clean technology, and narrowed down to three initiatives that take utilize Washington State's competitive advantages, and are in high growth attractive markets. Throughout this work, a focus has been on using a cluster economic approach, with an overall objective to take Washington State's small disparate kernels of clean energy companies, and to grow these in two dimensions: the depth of the value chain they cover (end products all the way back to raw material suppliers), and the breath of end markets served (multiple applications and geographies). As Washington State is the nation's fourth largest exporting state, an export focus into neighboring states and throughout the world was also applied.

To attain this broad objective, the project was broken down into three separate phases:

- » Phase I – Down-Select from the Broader Universe--- Where to Focus?
- » Phase II – Create an Action Roadmap for Select Areas--- What to Do?
- » Phase III – Create an Implementation Plan for Select Areas -- How to Do It?

These phases cover the where, what, and how of growing Washington State's clean energy economy.

Factors Considered – Phase I – Where to Focus

Clean Technology Narrowed to Clean Energy

Navigant's starting point was consideration of the broad world of clean technology markets, shown in Table B-1. The clean technology universe is generally divided into two broad categories: (a) environmental technologies, and (b) clean energy technologies. Environmental technologies encompass water and air treatment, conservation, and cleanup. Clean energy technologies encompass energy generation, storage, transmission, and usage (in buildings and for transportation).

From a clean technology investor standpoint²⁷, materials (nano-materials, new applications of old materials, etc.) can also be called out as a category. Navigant chose to place each material into the market where it is applied – i.e., in buildings, vehicles, energy storage, etc. Similarly, Navigant assumed that “manufacturing/industrial” technologies are a part of the waste reduction category.

As shown in Table B-1, environmental technologies were eliminated from further consideration at the outset of the project, as these technologies are relatively mature with lower growth prospects. In addition, they tend to be driven by national EPA policy and regulations, offering less state competitive differentiation. Once environmental technologies were excluded, a more detailed view of clean energy markets was examined, which are shown in Table B-2. Definitions of the each sub-segment are shown in Table B-3²⁸.

Table B-1
Clean Technology Definition

Segment		Sub-Category			Strategy Scope
CLEAN ENERGY	Energy Generation	Renewables			
	Energy Storage	Electrochemical	Mechanical		
	Energy Infrastructure	Transmission	Smart Grid		
	Energy Efficiency	Buildings	Services		
	Transportation	Vehicles	Fuels		
ENVIRONMENTAL	Water and Wastewater	Water /Wastewater Treatment	Water Conservation/ Reuse		
	Air and Environment	Emissions Control / Monitor	Cleanup / Safety	Trading / Offsets	
	Waste Reduction	Prevention / Reduction	Monitoring / Control	Recycling	
	Agriculture	Natural Pesticides	Land Management	Waste Reuse	

²⁷ For instance, <http://cleantech.com/about/cleantechdefinition.cfm>

²⁸ Clean tech definitions, and classifications, can become murky quickly. For instance, many home builders have recently changed some of their construction practices and materials, and labeled themselves “green.” What is meant by “green practices” can vary widely.

Table B-2
Clean Energy Segments and Sub-Segments

Energy Generation	Wind	Solar Electric	Hydro	Biomass	Geo-thermal	Wave / Marine	Solar Thermal	Nuclear
Energy Storage	Batteries	Fuel Cells						
Energy Infrastructure	Trans-mission	Smart Grid						
Energy Efficiency	HVAC	Green Buildings	Design / Services	Controls	EE Other*			
Transportation	High Efficiency Vehicles	Alternate Fuels (H₂, Biofuels)	Electric Vehicles incl. Hybrids	High Speed Rail				

Table B-3
Clean Energy Segment Definitions

Segment	Sub-Segment	Definition
Energy Generation	Wind	Electricity generated by wind power, whether on-shore or off-shore
	Solar Electric	Electricity generated by photovoltaic (PV)/solar technologies, or concentrating solar power (CPV) technologies.
	Hydro	Electricity generated by water moving downward through turbines, either at small or large scale.
	Biomass	Electricity generated through burning bio-materials, such as wood, crops, etc., to produce power. While controversy exists, this can be carbon neutral, as the CO ₂ originally captured by the feedstock crop is released in a renewable cycle.
	Geothermal	Electricity generated by utilizing the heat of the Earth's core, either at large or small scale.
	Wave / Marine	Electricity generated by using wave or ocean current energy.

Table B-3 Clean Energy Segment Definitions		
Segment	Sub-Segment	Definition
	Solar Thermal	Electricity generated by thermally heating a fluid or solid, and then using this heat to produce electricity (usually via a steam/turbine combination)
	Nuclear	Electricity generated by fission of uranium or derivatives.
Energy Storage	Batteries	Electricity stored chemically through use of electrochemical cells.
	Fuel Cells	Electricity stored by converting a source fuel into electricity.
Energy Infrastructure	Transmission	Transmission and distribution of electricity from sources to points of use.
	Smart Grid	Addition of an intelligence network to transmission grid infrastructure, to improve service, reduces losses, and better manages source/load imbalances.
Energy Efficiency (EE)	HVAC	Heating ventilation and air conditioning improvements to reduce energy usage.
	Green Buildings	A building design philosophy that minimizes energy and water usage, improves air quality, reduces building ecological impact, and reduces fossil fuel use.
	Design / Services	Building design and energy efficiency services to reduce energy usage.
	Controls	Controls technologies used to reduce energy usage.
	EE Other	Includes lighting, insulation, windows, and energy efficient appliances (including IT products, like cloud computing)
Transportation	High Efficiency Vehicles	Use of technologies that reduce fossil fuel consumption via higher efficiency, regenerative braking, better air flow, etc.
	Alternative Fuels	Biofuels, which can be carbon neutral as the CO ₂ originally captured by the feedstock crop is released in a renewable cycle. Also includes use of hydrogen fuels. This category includes both fuel production, and modification of current vehicle fleets to accept alternative fuels.
	Electric Vehicles	Use of electricity to improve fuel consumption. Includes current hybrids with relatively small battery capacity, to 100% electric vehicles, with no hydrocarbon engine and a large battery capacity.

Table B-3 Clean Energy Segment Definitions		
Segment	Sub-Segment	Definition
	High Speed Rail	Development of a high speed rail network as public transportation. Reduces fossil fuel emissions by substituting for automotive/truck emissions.

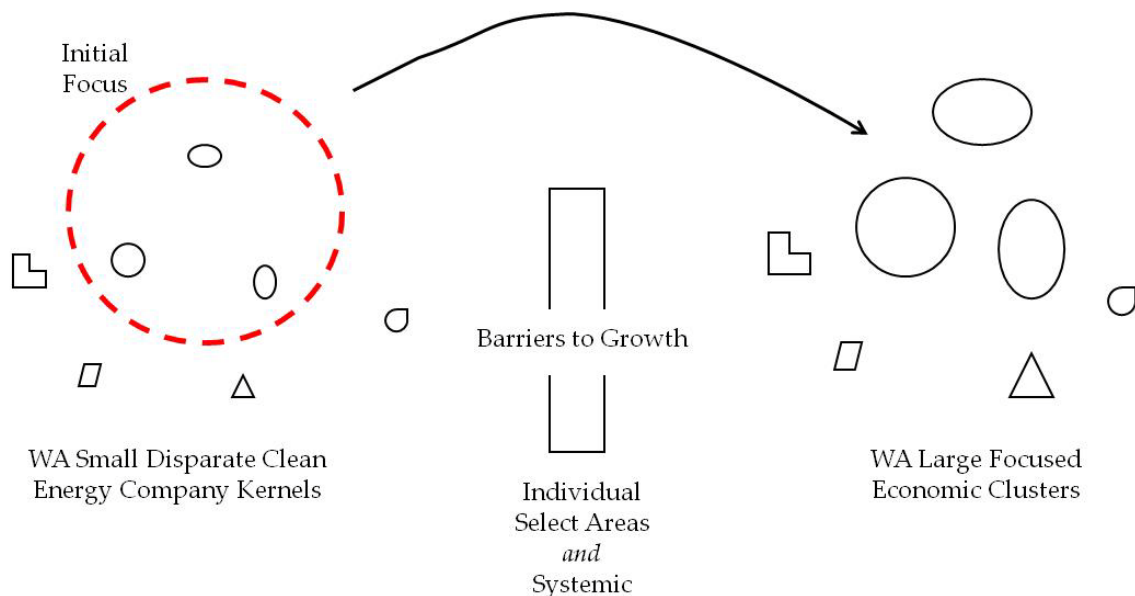
Constraints – Phase I – Where to Focus

Limited Resources

Washington State is a land of many disparate businesses, interests, and stakeholders, including “green” ones. At the outset, it was realized that the resources available for economic growth in Washington are limited -- in terms of attention, political capital, time, and money. Real, measurable, economic growth progress and growth, requires focusing of these limited resources on just a few areas. The action plan also addresses systemic growth barriers and limitations within the state. These initial focus areas are, therefore, a starting point, with broader applicability as systemic barriers are eliminated.

Figure B-1

Action Plan Focus Is a Starting Point, with Broader Applicability



Timing

The focus of the action plan is on actions that can have an impact in the three to five year mid-term range. A shorter-term focus of one to three years would not allow enough time for change to occur; a longer-term focus makes it difficult to measure results, and to create the jobs and economic growth that Washington State needs now, given the current economic climate.

Clean Energy Technology Segments Phase I Down-Selection –Where to Focus

Given the above objectives and constraints, and the list of clean energy segments in Table B-2 and defined in Table B-3, Navigant focused on evaluating external and internal cluster economic factors for Washington State, to determine which clean energy segments are the most likely to generate economic growth for Washington. Evaluation of the questions posed in Figure B-2 focused selection of the most likely growth segments for further analysis:

Figure B-2
Foundations of a Smart Growth Strategy

	External	Internal
Market	(1) What clean energy markets offer the greatest potential for revenue, business formation and high paying job growth ?	(2) In which segments is WA State poised to grow ? Are there sparks we can fan?
Basis	(4) What exogenous barriers must be surmounted to grow clean tech markets?	(3) Does WA State have a good foundation for economic growth in clean energy technology?

Section 1: Where is External Growth Most Likely?

Section 2: Which Internal Segments are Most Likely to Grow?

Section 3: Which Segments Match Washington State's Competitive Advantages?

Section 4: What External Barriers to Growth Exist?

These are each considered in turn over the next few sections (clockwise on Figure B-2).

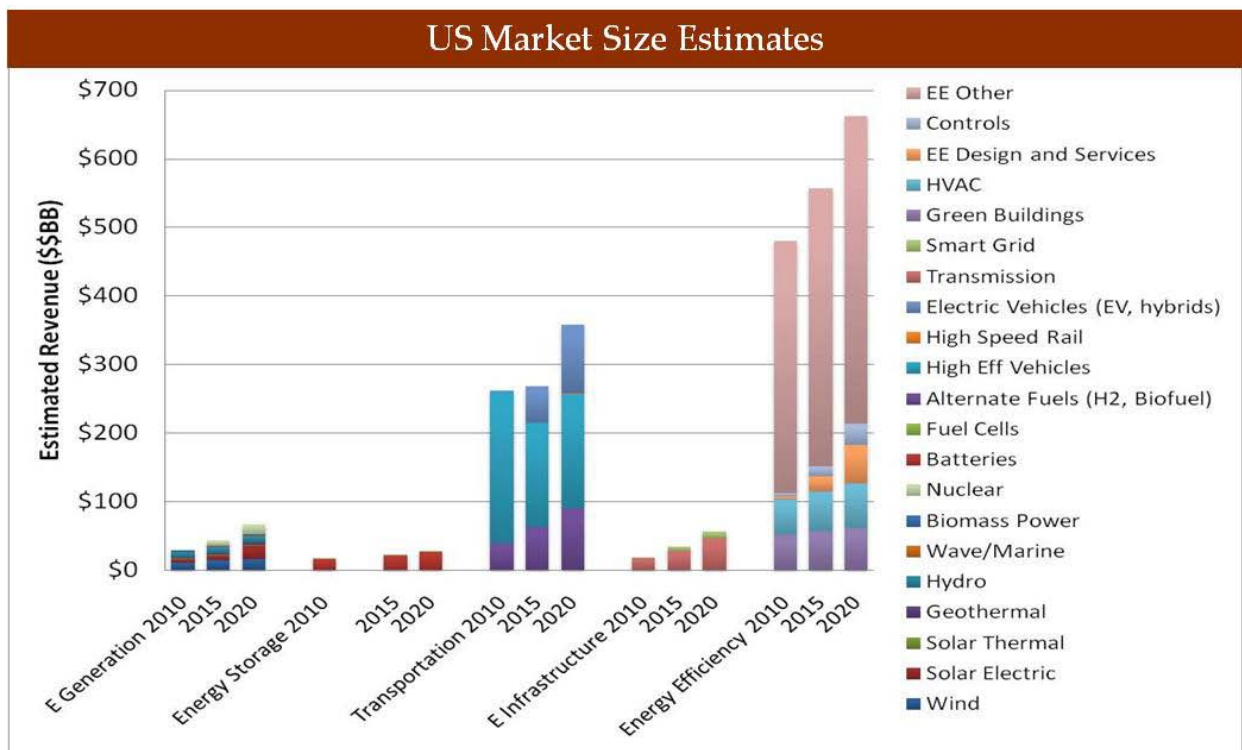
(1) Where is External Growth Most Likely?

Navigant estimated market size and growth for each of the markets shown in Table B-2, based on research and internal knowledge. These market size and growth estimates reflect the following assumptions:

- » A "Business as Usual" outlook;
- » National estimates from relevant associations (American Wind Energy Association (AWEA) for wind, Energy Information Agency (EIA), McGraw-Hill Construction, etc.); and
- » Navigant PV Service Program or other Navigant internal forecasts.

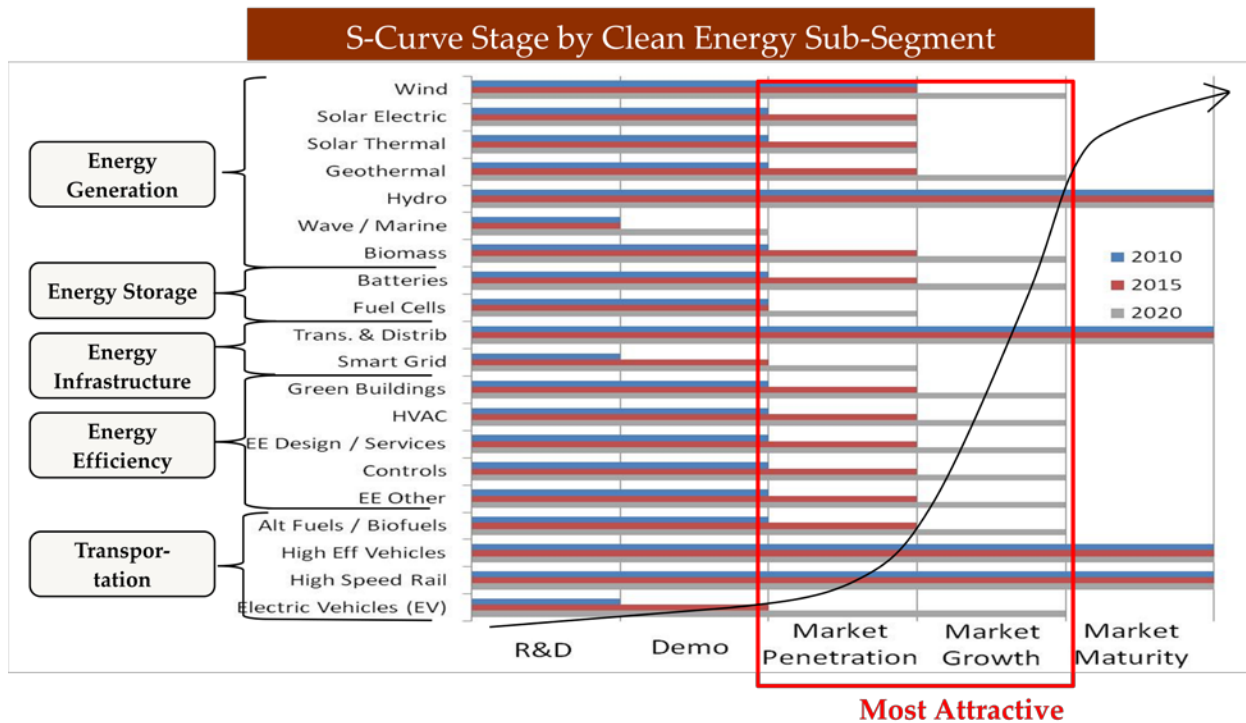
Note, given the difficulty of forecasting in general, that these estimates are indicative only, with varying levels of accuracy. They were used to eliminate low-growth markets, and are shown in Figure B-3.

Figure B-3
U.S. Market Size



As part of evaluating market attractiveness, Navigant also looked at the maturity level for each sector—Are products in the research and development (R&D) phase, demonstration, market entry, market growth, or market maturity phase? Markets in the “market penetration” and “market growth” phases were favored, as “R&D” and “Demo” markets are likely to take longer for products to reach the market than three to five years; and mature markets offer less growth potential. Qualitative ratings were used from Navigant subject matter experts, and are shown in Figure B-4.

Figure B-4
Market Maturity



(2) Which Internal Segments are Most Likely to Grow?

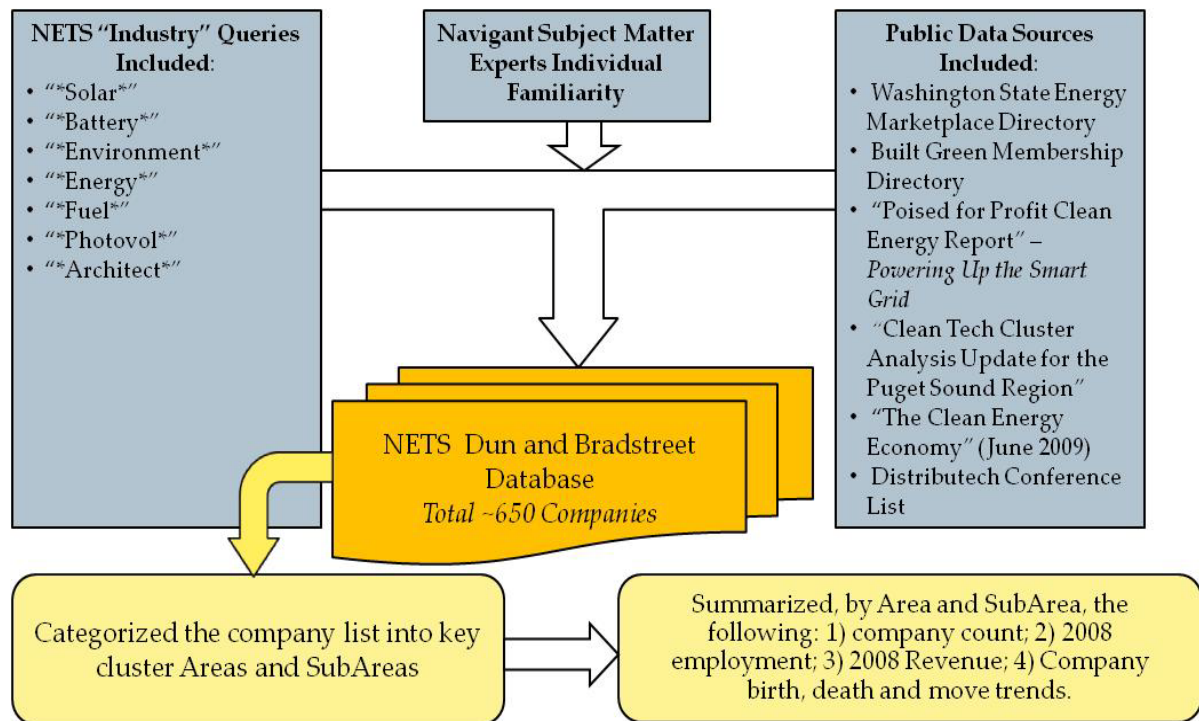
From a cluster economic viewpoint, it is much more difficult (but not impossible) to create something from nothing, than to nurture something that is already present. As the second criteria for down-selection, Navigant evaluated the presence of clean energy businesses in Washington State to determine if critical mass was present.

To evaluate seed potential, Navigant conducted analysis using Dun and Bradstreet's National Establishment Time Series (NETS) database for Washington State. Dun and Bradstreet build this database via annual phone and print surveys of all businesses within the state. Starting with public data sources (see Figure B-5) and Navigant knowledge of major players in each space, a search for companies within Washington State that were directly producing revenue in each of the segments was conducted, and the Dunn and Bradstreet database was used to catalog company number, revenue, and employee count.

Navigant analyzed firm level composition within clean energy technology segments and sub-segments, as SIC and NAIC code analysis cannot capture true clean energy technology segment characteristics due to overgeneralization of categories -- our employment and revenue numbers were much smaller than SIC/NAIC-based studies. Also, due to time and resource

constraints, we did not conduct sub-firm analysis. For instance, Paccar manufactures trucks, both conventional and high-efficiency; we did not apply a percentage to estimate what portion of employees and revenue is associated with clean energy. Firms identified are representative, not exhaustive– startups, in particular, are difficult to track. Utility employment was also under-represented, as the budget level of this project did not enable the resources to determine the number of people working in each category (energy efficiency, transmission vs. other, etc.) for the many utilities in the state.

Figure B-5
Washington “Seeds” Company Search Methodology and Data Sources



The NETS analysis shows which clean energy segments in Washington have current kernels from which to grow, as of 2008. See Figure B-6, Figure B-7, and Figure B-8 below.

Figure B-6
Washington Clean Energy Company Kernels – per Segment

Number of Companies in Washington per segment

Energy Generation	Wind	Solar Electric	Hydro	Biomass	Geo-thermal	Wave / Marine	Solar Thermal
# of Co's	19	34	52	1	3	1	22

Energy Storage	Batteries	Fuel Cells
# of Co's	11	4

Energy Infrastructure	Utility* Transmission	Smart Grid
# of Co's	8	37

Energy Efficiency	HVAC	Green Buildings	Design/Services	Controls	Other
# of Co's	14	219	13	1	19

Transportation	Efficient Vehicles	Alt Fuels (H2, Biofuels)	Electric Vehicles
# of Co's	7	41	9

Cross-Cutting	Smart Grid/ Energy Efficiency	Smart Grid/ Transmission	Biomass / Biofuels
# of Co's	16	7	17

* Transmission outside of utilities and EPC contractors is difficult to quantify


 = Highest in Segment

Figure B-7
Washington Company Clean Energy Kernel Employment – per Segment

Number of Employees in Washington per segment

Energy Generation	Wind	PV	Hydro	Biomass	Geo-thermal	Wave / Marine	Solar Heating
# of People	224	704	1,429	13	20	-	35

Energy Storage	Batteries	Fuel Cells
# of People	501	105

Energy Infrastructure	Utility* Transmission	Smart Grid
# of People	5,010	3,910

Note that "Utility Transmission" includes utility staff, and is not considered the same type of growth source as those in other segments, resulting in different ranking

Energy Efficiency	HVAC	Green Buildings	Design/Services	Controls	Other
# of People	1,011	3,382	376	227	245

Transportation	Efficient Vehicles	Alt Fuels (H2, Biofuels)	Electric Vehicles
# of People	1,660	812	11

Cross-Cutting	Smart Grid/ Energy Efficiency	Smart Grid/ Transmission	Biomass / Biofuels
# of Co's	163	315	5,617

* Transmission outside of utilities and EPC contractors is difficult to quantify

 = Highest in Segment

Figure B-8

Sales Revenue in Washington per segment

Energy Generation	Wind	PV	Hydro	Biomass	Geo-thermal	Wave / Marine	Solar Heating
US\$m	41	147	237	1	2	-	6


Energy Storage	Batteries	Fuel Cells
US\$m	118	8

Energy Infrastructure	Utility*	Smart Grid
US\$m	988	954

Energy Efficiency	HVAC	Green Buildings	Design/Services	Controls	Other
US\$m	135	579	44	29	31

Transportation	Vehicles	Alt. Fuels (H ₂ , biofuels)	Electric Vehicles
US\$m	274	171	2

Cross-Cutting	Smart Grid/ Energy Efficiency	Smart Grid/ Transmission	Biomass/Biofuels
# of Co's	16	31	695

 = Highest in Segment

Note that "Utility Transmission" includes utility staff, and is not considered the same type of growth source as those in other segments, resulting in different ranking

* Transmission outside of utilities and EPC contractors is difficult to quantify

Washington Company Clean Energy Revenue – per Segment

(3) Which Segments Match Washington State's Competitive Advantages?

To evaluate Washington State's cluster economic foundations, Navigant evaluated the state's competitive advantages in detail, relevant to those factors that determine why companies and economic activity cluster where they do. These factors are listed in Table B-4.

Table B-4 Cluster Growth Factors	
Factor	Description
Innovation	New ideas that solve industry problems give rise to economic growth and new companies.
Workforce	Worker skill-sets and knowledge spawn growth.
Financing	Availability of capital accelerates company growth and expansion
Logistics	Presence of critical logistics – roads, pipelines, refineries, etc. These are large enabling expenditures of capital that serve as market barriers to others.

Table B-4 Cluster Growth Factors	
Factor	Description
Natural Resources	Presence of critical natural resources --- wind for wind energy, sunshine for solar, etc., that allows a market to grow locally.
Governance-Regulations	Presence or absence of regulation can spur or hinder growth (for example, EPA regulations for air and water quality).
Governance-Incentives	Presence or availability of incentives can spur growth (for example, the Feed in Tariff in Germany for solar markets).
Governance-Regulatory Alignment	Speed and ease of permitting projects as a whole can spur or slow local markets
Marketing	Presence or absence of channels to market and distribution networks can spur or hinder growth.
Quality of Life	Cost of living, good schools, etc., can attract mobile workers to a locale.

Table B-5 shows a summary of Washington State’s clean energy technology competitive advantages for these critical cluster growth factors. They were assessed via research and interviews with companies in the appropriate sector.

Table B-5

WA State Competitive Advantages							
	Innovation	Workforce	Finance	Logistics Infrastructure	Resources	Governance (Regulation)	Quality of Life
Energy Generation	R&D Cluster: University of WA, Washington State, PNNL, Battelle, Analytical Resources (Biofuels)	Forest / Agriculture Cluster	High VC/Angel activity; high relative Federal funding; Indian nations can obtain low interest financing	Excess Refinery Capacity for Biofuels Ports Pipelines	Hydro Geothermal Strong Tides Wind	Indian Reservations can ease permitting	Natural Beauty/ Climate, Housing Costs
Energy Storage				Transmission Grid	Solar (East) Bio Feed-stocks Cooling Water		
Energy Infrastructure		IT Cluster		Pacific Intertie Transmission Network Rights of Way	Inexpensive Electricity		
Energy Efficiency	McKinstry Innovation Center	Large utility work force			Inexpensive Electricity Hindrance	Relatively Stringent Codes spur market	
Transportation	↓	Aerospace Cluster					
Bold = common knowledge in non-energy sectors that benefit clean energy			Standard font = advantage		Italics = Disadvantage		

Washington State Competitive Advantages

(4) What External Barriers to Growth Exist?

Based on Navigant's expertise, exogenous barriers to market growth were evaluated after the down-selection process was completed, with specific actions to address these barriers. See the Market Driving Initiatives section below.

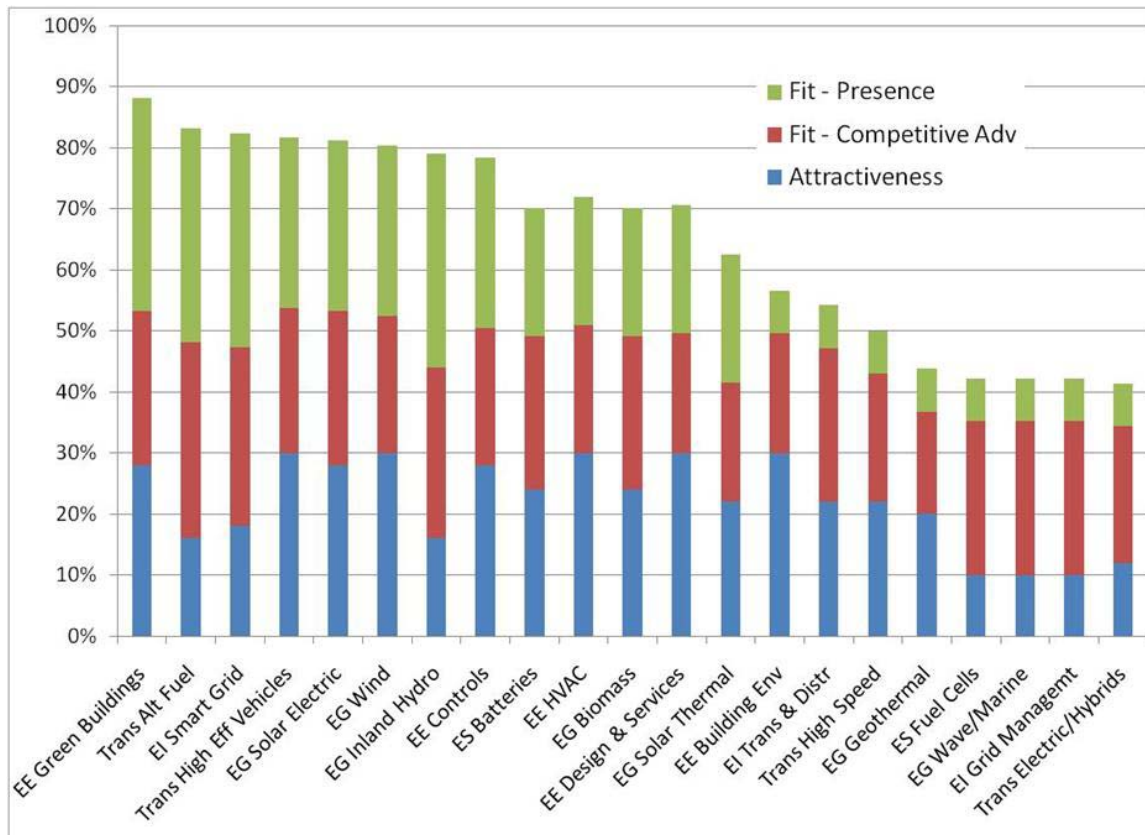
Phase I Screening Results – Where to Focus

Overall Initial Ranking Results

For each of the attractiveness and fit factors above, (1) market size and growth, (2) presence of Washington company kernels, and (3) Washington State competitive advantages, weighted rankings were used (approximately 1/3 each) to rank all 20 clean energy sectors. The results are shown in Figure B-9.

Figure B-9

Attractiveness and Fit Rankings per Clean Energy Segment



Subsequent to development of this ranking, the following category modifications were made at the end of Phase I.

- 1) **Bioenergy** --- Biofuels (selling fuel to aviation markets) and Biomass power (selling electricity from burning wood and other bio-sources) were combined, as these segments share feed stocks, kindred technologies, similar workforce needs, and are synergistic in terms of finance, regulation and associated infrastructure.
- 2) **Smart Grid** – Adds intelligence to the electrical grid to reduce overall consumption. Combines sensor, controls, and IT knowledge bases in Washington State with storage to enable intermittent renewables.
- 3) **Energy Efficiency & Green Buildings** were combined, as they share similar workforce needs, regulatory structure/incentive needs, inter-related financing and equity investment criteria, and timing for implementation/expansion.
- 4) **High Efficiency Vehicles** –Includes all methods of meeting higher efficiency fuel standards --- dieselization, light-weighting, combustion improvements, air streamlining, etc. Vehicle expertise and light-weighting capability is present in Washington.
- 5) **Wind and Solar.** Wind in the near-term and solar in the longer-term has out-of-PNW export potential and the PNW region is dealing now with grid and resource integration, potentially leading other regions, and providing for smart grid technology opportunities.

These categorizations, with a few exceptions, confirmed the Washington CELC’s initial impressions regarding key focal areas for a clean energy action plan that was developed through a consensus process.

Phase II Down-Selection – What to Do

In Phase II, the list of focal areas was narrowed further, from five areas to three, as the action plan was created and a closer look at Washington State’s competitiveness was assessed. Navigant assessed Washington States’ competitive status relative to other states, looking at a variety of potential measurements. For example, for innovation we evaluated presence of research facilities, patents by sector, and conversion of patents into startups by local universities. For workforce, Navigant looked at key job classifications by sector, evaluating the percentage of the workforce in those occupations compared to national averages. The summary results are shown in Table B-6 . Washington, in general, is approximately fifth to tenth overall, compared to the other 50 U.S. states.

Table B-6
Washington State Cluster Comparison to All 50 U.S. States

WA State Clean Energy Focus Area Rankings							
WA Rank (out of 50)	Green Building	Energy Efficiency	Biofuels	Smart Grid	Vehicles	Wind	Solar
Innovation-Patents	10	6	8	6	10	11	8
-- Conversion	Top 20						
Workforce	12	16	12	6	15	27	10
Financing	5 th Total VC investments, 4 th # of deals						
Resources			3			17	16
Infrastructure			++		16 NW #1		
Governance		Top Tier				Top Tier	
Quality of Life	5-6 th in home prices, relatively stable						
Overall	Top 50%	Top 5	5-10th	Top Tier	#1 air #4 truck	5 th	Mid Tier

Navigant also further investigated the depth and breadth of the value chains for each area, to further validate the initial company presence work done in Phase I, and the ability of Washington State to be competitive world-wide as well as the United States. For a variety of reasons, the Washington CELC narrowed the list to the following three focal areas for Phase III and this report:

- » Bioenergy;
- » Renewables Integration / Smart Grid; and
- » Energy Efficiency/Green Buildings/Smart Grid.

Areas for future work, which include the excluded categories, are further described in Appendix D: Alternative Clean Energy Segments for Separate Consideration. These three areas represent starting points, for addressing individual barriers to growth for these sectors, as well as a focal point for addressing systemic barriers to growth in Washington. As these systemic barriers are addressed, Navigant expects further growth outside these initial focal points.

Appendix C: Representative State Clean Energy Support Summary

Figure C-1²⁹

State	Special Funds & Programs	Renewable Portfolio Standard	Energy Efficiency Resource Standard	Biofuels Programs
California	\$150 to \$200 M/yr for RE, EE projects and R&D from public benefits charge per kWh of retail energy use and other funding sources. California Solar Incentive state tax credits.	20% by 2010 ³⁰	3% of total energy by 2012	In-state production & use targets. Adopted state Bioenergy Action Plan
Colorado	Clean Energy Fund \$25M/yr; Business Energy Tax Credit; Specific Company Incentives	30% by 2020	1.5% of total energy by 2020	State-owned vehicle biodiesel requirements
Illinois	\$5.5 M/yr for renewable energy projects	25% by 2025	2% yr. savings by 2015	Conventional fuel replacement target & state-owned vehicle fuel requirements
Iowa	Iowa Power Fund - \$25 M/yr 4 yrs 2007-2011 EE and RE projects	105 MW total for 2 IOUs	1.5% savings goal eff. 2010	Conventional fuel replacement target & state-owned vehicle fuel requirements
Massachusetts	\$200 M 2010-2012 for energy efficiency investment; \$20-24 M/yr using system benefit charge; \$8M separately; \$20M one-time from MA general fund; Solar REC part of RPS is \$75M/yr	15% by 2020, 1%/yr add'l after	3.5% savings by 2020	Minimum biodiesel blending requirement & state-owned vehicle fuel requirements
New Jersey	NJ Clean Energy Program multi-yr, 2010: \$267 M for EE, \$183 M for RE, expires 2012	22.5% by 2020	ruling in process	Conventional fuel replacement target & state-owned vehicle fuel requirements
New York	1.4% of utility revenue 1998-2011 applied to clean energy activities, avg. \$146-169 M/yr for energy efficiency and renewable energy	25% by 2013	15% reduction by 2015	state-owned vehicle fuel requirements
Oregon	Business Energy Tax Credit \$120-150 MM/yr loans; Res Energy Tax Credits; public purpose charge of 3%; Oregon Energy Trust - \$57 M/yr	25% by 2025	n/a	Minimum ethanol & biodiesel blend requirements & Portland city-owned vehicle fuel requirements
Pennsylvania	PA Energy Development Authority \$350M loans/grants for new products/businesses; \$200M solar incentives; \$150M energy site prep; \$56M clean energy R&D; \$50M energy projects seeking venture capital; \$44M AC/frig swap program	18% by 2020	10% reduction by 2020, incl DG, hydro, MSW	Minimum ethanol & biodiesel blend requirements
Texas	\$99M LoanSTAR Revolving Loan Program; \$1.1 M RE Technology Grants, \$.9M Schools EE Grants, \$1.3M Alternative fuels/hybrids grants,	10,000 MW by 2020	20% of load growth eff. 2009	state-owned vehicle fuel requirements
Washington	Solar Incentives; \$60.9M State Energy Program; \$100K/project WSU Manufacturing Efficiency Program; Utility rebates and programs	15% by 2020	"all cost-effective" EE	2% of transportation fuel biofuel target for local gov't., State Bioenergy Lab
Wisconsin	Over \$100M/yr for energy efficiency and renewable energy programs and projects	10% by 2015	pending: 2%/yr for elec, 2%/yr for nat. gas	Woody biomass corporate tax credit (10%)

²⁹ These state-by-state examples are representative only and are in a regular state of change. Descriptions included are not exhaustive. Some programs are temporary and others apply to only a portion of utilities or customer groups within a state or utility territory.

³⁰ Administrative and legislative efforts seeking increasing the RPS to 33% by 2020 for all California utilities, regardless of ownership type is unlikely to be implemented in 2010, but likely sought again in 2011.

Appendix D: Alternative Clean Energy Segments for Separate Consideration

A few clean tech sectors were looked at in more detail, but not included in the final three. These may be worthy of further investigation at the state level at another time or through a different venue.

Nuclear

Nuclear power generation was considered preliminarily as part of the Phase I clean energy technology business segments, but was not included for detailed assessment in Phase II for the following reasons:

- » While there is potential for resurgence of nuclear power generation in the U.S. given limitations on coal-fired generation expansion caused by expected future carbon emission reduction mandates, U.S. NRC licensing requirements for “next generation” nuclear will push any significant new nuclear generation until well past 2020, beyond the time horizon for this Clean Energy Technology Strategy implementation;
- » Uncertainties on cost-competitiveness of nuclear generation with alternative sources will also push rapid implementation beyond 2020;
- » Export of Washington State’s nuclear technology know-how will likely create a majority of construction jobs in foreign countries, diluting Washington’s growth; assessment of this global market opportunity is beyond the scope of current U.S. focus; and
- » Washington’s multi-national nuclear construction firms are relatively mature and self-supporting.

Despite the limitations on timing of significant new nuclear generation additions in the U.S., the presence of a world-class nuclear industry cluster at Hanford warrants future consideration of nuclear energy as a business growth opportunity outside the scope of this assignment.

High Efficiency Vehicles

Congress and the U.S. Department of Transportation are likely implementing increasingly stringent fuel efficiency standards over the coming decades. Compliance with these requirements will likely spur “least cost” methods of providing efficiency gains into the marketplace in the coming decades. Paccar, Boeing are #4 and #1 in trucks and airplanes respectively, with unique Washington capabilities in the areas of streamlining, light-weighting, and others.

A cursory investigation into the breadth and depth of these value chains found that for trucks and cars, the supplier base for cost effective efficiency improvements is largely located closer to the center of the country; and the aerospace cluster is already well-served by other organizations.

Electric Vehicles

Electric vehicles provide offer exciting possibilities not only for vehicle efficiency, but also the potential to use on-board batteries as an electrical storage medium for the grid. However, relatively slow innovation progress in battery energy density has limited electric vehicle range, and therefore customer acceptance, for some time. Newer lithium ion and other technologies are in development, but relatively long prove-out cycles appear to lengthen the spread of wide scale adoption of all-electric or largely electric vehicles to farther out than the three to five year timeframe that is the focus for this project.

The prospect for electric vehicles as a major global growth industry, and the potential of integrating electric vehicle batteries as grid storage warrants future focus on this clean energy sector.