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REPAIR WASHINGTON:

Creating Good Jobs, Strengthening Infrastructure, and Building Climate Solutions

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Repair Washington: Creating Good Jobs, Strengthening Infrastructure, and Building Climate Solutions

EXECUTIVE SUMMARY

Many sectors of Washington's infrastructure systems are in dire need of repair. Our state's roads and bridges, water, waste water, transit, energy, and communication systems need increased investment to be efficient, safe, and productive for Washington residents.

Rebuilding and upgrading Washington's infrastructure gives us a great opportunity to create tens of thousands of family wage union jobs, reduce income inequality, make our economy more efficient and productive, reduce climate-disrupting pollution, and protect our communities from severe weather effects caused by climate change.

In this report, the BlueGreen Alliance identifies needed investment—some of which is already in the planning stages—in roads, bridges, transit, waste water, drinking water, electricity, natural gas and a smarter energy grid. After identifying these needs, we estimated the number of jobs that would be created or sustained by making these essential investments in repairing and modernizing our basic infrastructure systems.

We estimate approximately 77,900 jobs could be created or sustained across the Washington economy each year by making much-needed investments in our basic infrastructure systems. This includes the number of direct jobs from impacted sectors like construction laborers, equipment operators, and maintenance workers, as well as the number of indirect jobs from industries that service those sectors and supply chains—including the manufacturing of materials, components, and equipment. Specific energy projects in Washington, such as the Central Ferry-Lower Monumental transmission line and natural gas pipeline repair and replacement, hold the potential of creating and sustaining additional jobs through the economy. In addition, we estimated the number of induced jobs supported as the workers buy goods and services, including increased demand for retail, housing, and financial services.

Repairing and Upgrading Washington: A Job Creation Opportunity	
Transportation	Investing $1.76 billion per year in improving the efficiency and reliability of our road and bridge networks over the next 20 years would create or sustain an estimated **48,790 jobs** economy-wide annually.
Rail	Investing $97 million per year over the next 20 years in freight rail would create or sustain an estimated **1,930 jobs** throughout the economy.
Transit	Investing $254 million a year in transit preservation and expansion over the next 20 years would create or sustain an estimated **9,180 jobs** throughout the economy each year.

Waste Water	Investing $263 million a year in waste water infrastructure over the next 20 years would create or sustain an estimated **5,260 jobs** throughout the economy each year.
Drinking Water	Investing $476 million a year in rehabilitating and replacing drinking water infrastructure over the next 20 years would create or sustain an estimated **9,500 jobs** throughout the economy each year.
Electricity	Investing $90 million on the Central Ferry-Lower Monumental transmission line will create or sustain an estimated **1,170 jobs** throughout the economy.
Natural Gas	Repairing/replacing an existing 522 miles of "elevated risk" natural gas pipelines with protected steel pipes would create or sustain an estimated **886** jobs throughout the economy.
Smart Grid	Investing $140 million in smart grid advanced metering infrastructure build out per year for 5 ½ years would create or sustain an estimated **3,300 jobs** throughout the economy each year.

The BlueGreen Alliance is a national partnership of labor unions and environmental organizations. This report provides solid evidence that investing in our public infrastructure has many benefits. It should be noted that this does not constitute an endorsement of any individual project by partners of the Washington BlueGreen Alliance.

INTRODUCTION

Infrastructure is the backbone of America. Communities across the country need to move goods, transmit power, deliver drinkable water, and provide the means to communicate. These systems seem invisible when they function properly, but the impacts of infrastructure failure are immediately and devastatingly clear. More and more systems are failing as they age and suffer from chronic underinvestment. At the same time, impacts of climate change—such as severe weather like floods, droughts, and super storms—are putting increasing strain on communities and their vulnerable infrastructure systems.

Economic Impact of Failing Infrastructure

The American Society of Civil Engineers (ASCE) publishes a *Report Card for America's Infrastructure* every four years and, in 2013, the nation earned a "D+" average (ASCE 2013b, p. 2). In 2011, ASCE conducted a series of economic reports titled *Failure to Act* that determined the impact of low grades for infrastructure systems on America's economic future. They then produced a report that discussed

the effects of multiple infrastructure systems deteriorating. This report, titled *Failure to Act: The Impact of Current Infrastructure Investment on America's Economic Future,* found that "deteriorating infrastructure, long known to be a public safety issue, has a cascading impact on the nation's economy, negatively affecting business productivity, gross domestic product (GDP), employment, personal income, and international competitiveness" (ASCE 2013a, p. 4). This means that underinvestment in infrastructure ultimately leads to higher costs being paid by businesses and households (ASCE 2013a, p.6). They also found that weakening of multiple infrastructure systems would have a greater effect than the sum of individual infrastructure failures (ASCE 2013a, p. 23).

Environmental Impact of Failing Infrastructure

Failing and inefficient infrastructure systems use more natural resources than robust and efficient systems do. They also produce more pollutants and greenhouse gases. Reroutes due to damaged roads and bridge closings can increase congestion of vehicle traffic, wasting fuel and generating more emissions. Out of date or absent traffic control systems in cities can lead to increased congestion in high density areas, particularly during peak commuting times. Rail systems are an efficient way to move goods, but these benefits are unobtainable when the rail system is chronically operating over capacity or without good connections to other transportation systems for the "last mile" of distribution networks. A lack of good transit options increase personal vehicle miles traveled and contributes to congestion and emissions. Aging electrical grids and transmission congestion can lead to unreliable power; outages can cause environmental problems at water treatment plants, refineries, or other emergency systems that require electricity. Additionally, these electrical grids may not allow for timely connection of renewable electricity sources. Our drinking water and waste water systems average over 800 water main breaks per day nationwide, leaking more than 15 percent of our drinking water before it ever reaches our homes and businesses. Such waste also unnecessarily consumes significant amounts of electricity (Uni-Bell PVC Pipe Association 2011).

As noted in the *Failure to Act: The Impact of Current Infrastructure Investment on America's Economic Future* report, the negative impacts of failing infrastructure on the economy worsen over time if nothing is done (ASCE 2013a, p. 5). The same is true for damage to the environment, whether it is air or water pollution or greenhouse gases. Improvements to infrastructure systems reduce energy use, lower emissions, and improve resilience.

Opportunities

Rebuilding transportation, water, energy, and communication systems can help communities to increase public safety and withstand increasingly frequent severe weather events and super storms. Resilient and well-maintained infrastructure is also more efficient—saving energy, money, and natural resources as well as reducing carbon pollution that causes climate change. In addition, repairing

America's infrastructure creates good jobs and other economic benefits such as higher productivity and increased competitiveness.

On a national level, ASCE estimates it would require $3.6 trillion of investment to return America's overall infrastructure to a grade of "B" (ASCE 2013b). Such investments would create significant job benefits while restoring efficiency to the American economy.

This *Repair Washington: Creating Good Jobs, Strengthening Infrastructure, and Building Climate Solutions* report first highlights infrastructure needs that have been identified across the state and then illustrates the economic and job creation opportunity of repairing Washington.

The latest state level infrastructure report card, the *2013 Report Card for Washington's Infrastructure,* conducted by the American Society of Civil Engineers (ASCE) Seattle Section in 2013 graded nine categories of Washington's infrastructure and the state earned an overall "C" average. Dams received the highest grade of B+; six Cs and two Ds make up the rest of the grades (ASCE Seattle Section 2013, p. 4). Some sectors of Washington's infrastructure are in dire need of repair, costing the state resources such as time and money, polluting the environment, and limiting job growth causing job losses.

The 2013 Report Card for America's Infrastructure Washington state summary reports the following:

- $5.3 billion in wastewater infrastructure needs over the next 20 years
- 366 of the 7,840 bridges in Washington (4.7%) are considered structurally deficient
- 1,693 of the 7,840 bridges in Washington (21.6%) are considered functionally obsolete
- Driving on roads in need of repair costs Washington motorists $1.349 million a year in extra vehicle repairs and operating costs – $272 per motorist.
- 67% of Washington's major roads are in poor or mediocre condition.

(ASCE 2013c)

Addressing Washington's infrastructure problems now will save money, increase efficiency, create jobs, make businesses more competitive, and protect the environment.

SURFACE TRANSPORTATION

According to the ASCE report *Failure to Act: The Economic Impact of Current Investment Trends in Surface Transportation*, failure to repair surface transportation systems costs consumers and businesses money, reduces productivity and competitiveness of American firms, and costs jobs in the American economy (ASCE 2011b, p. 5). In 2010, it was estimated that deficiencies in America's surface transportation systems cost households and businesses nearly $130 billion, including $97 billion in vehicle operating costs, $32 billion in travel time delays, $1.2 billion in safety costs and $590 million in environmental costs (ASCE 2011b, p. 3).

In 2010, the Washington State Transportation Commission published a comprehensive statewide transportation policy plan titled *Washington State Transportation 2030: Connecting Washington Communities for a Prosperous Future*. The plan is meant to provide a 20 year policy and investment guide, and the information on transportation needs in the following sections of this report comes from this long range transportation plan (WSTC 2010). The plan lists policies in context of foundational themes that were identified as the priorities that guide development of the plan:

- Washington faces a structural transportation funding problem and additional revenue is essential;
- The state's transportation system needs to work as an integrated network, effectively connecting across modes and jurisdictions; and
- Preservation and maintenance of the existing transportation system is the most critical need.

(WSTC 2010, p. iv).

In addition to saving money, increasing efficiency and improving safety, repairing Washington's surface transportation systems will also create jobs, while reducing pollution and climate pollution. Prioritizing green infrastructure investments in the transportation system could achieve even more reductions in environmental impact. For example, the annual mobility report published by the Texas A&M Transportation Institute estimated traffic congestion in Seattle alone costs each area commuter an average of 54 hour extra hours, 25 extra gallons of fuel, and creates an additional 516 pounds of carbon dioxide per year (Texas A&M Transportation Institute).

ROADS & BRIDGES

As mentioned above, the *2013 Report Card for Washington's Infrastructure*, found that 34.7 percent of Washington bridges are considered structurally deficient and 20 percent are considered functionally obsolete. The overall grade for Washington bridges was "Cf ". In addition, 36 percent are more than 50 years old and in the next 20 years another third of the state's bridges will be beyond their design life (ASCE Seattle Section 2013, p. 15). The report card also states that over 67 million vehicles cross Washington state bridges every day and 25 percent of crossings involve functionally obsolete bridges; additionally, daily traffic volumes are expected to increase 46 percent to 98 million over the next 30 years (p. 16).

The overall grade Washington roads is "D+". The report card found that Washington streets and highways are facing a crisis due to an aging system experiencing increasing congestion, higher construction costs and declining revenue from gas taxes, reduced maintenance, and uncertain funding (ASCE Seattle Section 2013, p. 39). The state's roads are also vulnerable to natural events including fires, rockfalls, landslides and avalanches, leading Washington State Department of Transportation to take nationally recognized action to evaluate and reduce effects of climate change (p. 43). The

Washington State Transportation 2030 plan reports $35.1 billion in needs for the Washington highway system over the next 20 years (WSTC 2010, p. 6).

Investing $1.76 billion per year over the next 20 years would create or sustain an estimated 48,790 jobs throughout the economy each year.[1]

RAIL

The *2013 Report Card for Washington's Infrastructure* graded the rail system at "C-". The report card found that while capacity of the system is adequate, there is concern about some congested corridors and the condition of some of the short line rails; additionally, the report card estimates that by 2030, some 90 percent of the $2 billion needed for improvements is unfunded (ASCE Seattle Section 2013, p. 35). The *Washington State Transportation 2030* plan reports $6.75 billion in needs for the Washington freight rail system over the next 20 years (WSTC 2010, p. 6).

Investing $97 million in freight rail per year over the next 20 years would create or sustain an estimated 1,930 jobs throughout the economy each year.[2]

TRANSIT

The *2013 Report Card for Washington's Infrastructure* graded the transit system at "D+"; while the state's population has grown 38 percent since 1990, competition for funds and a lack of long term funding is keeping transit maintenance and expansion from keeping up (ASCE Seattle Section 2013, p. 65). In fact, despite increased demand, the overall capacity of the system has decreased in recent years (p. 66). The *Washington State Transportation 2030* plan reports $5.1 billion in needs for the Washington pubic transportation system over the next 20 years (WSTC 2010, p. 6).

Investing $254 million a year in transit preservation and expansion over the next 20 years would create or sustain an estimated 9,180 jobs throughout the economy each year.[3]

Investment in surface transportation infrastructure creates direct jobs through the installation, maintenance, and renovation of roads, bridges, rail, and transit systems. Jobs created or maintained by this investment include the following: construction laborers, equipment operators, pipelayers, plumbers, sheet metal workers, electricians, brickmasons, maintenance and repair workers welders,

[1] Calculated using jobs number from the Federal Highway Administration 27,800 jobs per $1 billion in highway investment (Levine 2009, p. 7) and investment number $35.1 billion as cited above annualized over 20 years.

[2] Calculated using jobs number from Gauging Growth 20,000 jobs per $1 billion invested in rail (McCulloch, Pollack, & Van Gilder 2011, p. 7) and the investment number $6.75 billion as cited above annualized over 20 years.

[3] Calculated using jobs number from American Public Transportation Association: 36,108 jobs per $1 billion investment in public transportation (Weisbrod & Reno 2009, p. 28) and the investment number $5.1 billion, as cited above, annualized over 20 years.

mechanics, and others (U.S. BLS 2012). These projects drive demand for equipment and materials, creating indirect jobs in manufacturing, transportation, and logistics.

WATER

The ASCE report *Failure to Act: The Economic Impact of Current Investment Trends in Water & Wastewater Treatment Infrastructure* found that failure to repair or maintain drinking water and waste water treatment will likely result in unreliable water service and inadequate waste water treatment; pipes will leak, the construction of the new facilities required to meet stringent environmental standards will be delayed, addressing the gap will become increasingly more expensive, and waters will be polluted (ASCE 2011c). Water shortages will lead to higher rates for businesses and households and increased costs due to unreliable delivery and waste water treatment services (ASCE 2011c, p. v).

Repairing water systems saves money, increases efficiency, and improves water quality while at the same time creating jobs, conserving water, and reducing wasted energy. Less energy wasted means fewer carbon emissions, reducing our impact on climate. For example, even simple approaches, such as retrofitting water fixtures and appliances, could reduce hot water energy use by approximately 20 percent (Griffiths-Sattenspiel & Wilson 2009).

WASTE WATER

The 2013 *Report Card for America's Infrastructure* reports that during heavy rainfalls, combined sewage overflows (CSOs) discharge untreated sewage into the surrounding rivers and streams; aging pipes and inadequate capacity leads to an estimated discharge of 900 billion gallons of this untreated sewage each year throughout the country (ASCE 2011c, p. iv). According to the most recent data from the U.S. Environmental Protection Agency (EPA) *2008 Clean Watersheds Needs Survey*,[4] Washington has reported $5.26 billion in needs for waste water infrastructure over the next 20 years to address this issue (U.S. EPA 2014).

Washington has led the way in implemented sustainable approaches in mitigating stormwater, which in many cases are as effective and can be delivered at costs comparable to traditional methods. For example, innovative green infrastructure projects implemented in Seattle manage stormwater impacts within standards, while also reducing negative impacts to local creeks by 74 to 99 percent (Seattle Public Utilities 2014).

[4] The survey cited was conducted in 2008; a newer survey was conducted in 2012 and the report and data are expected to be available on the U.S. EPA website in early 2014.

Investing $263 million a year in waste water infrastructure over the next 20 years would create or sustain an estimated 5,200 jobs throughout the economy each year.[5] Low-impact development (LID) and green infrastructure stormwater approaches have been demonstrated to deliver cost-benefits comparable to traditional infrastructure approaches (University of New Hampshire Stormwater Center 2010).

CLEAN WATER

The *2013 Report Card for Washington's Infrastructure* gave the drinking water system an overall grade of "C-" and found that many problems are due to the lack of a customer base to finance repairs for smaller systems (ASCE Seattle Section 2013, p. 29-31). Aging pipelines (some more than 40 years old) are contributing to leaks; Walla Walla reported losing 33 percent of their water supply to leaks, and North Bend reported losing 30 percent (p. 31). The report notes that upgrade and replacement is not keeping pace with the needs, and points to the U.S. Environmental Protection Agency (EPA) *Drinking Water Infrastructure Needs Survey and Assessment* to identify needs of the system in Washington. In their most recent Fifth Report to Congress in 2011, the survey identified $9.5 billion in needs over the next 20 years for the state drinking water system (U. S. EPA 2013, p. 18).

According to the Report:[6]

- 61 percent of Washington's needs are in transmission and distribution projects, which are critical to the delivery of safe drinking water and can help ensure compliance with many regulatory requirements (p. 6).
- 17 percent of Washington's needs are in treatment projects, which remove or inactivate disease-causing organisms or remove or prevent the formation of harmful chemicals in order to meet regulatory requirements (p. 7).
- 13 percent of Washington's needs are in storage projects, which are critical to ensure adequate supplies of treated water to the public, particularly during periods of peak demand (p. 8).
- 7 percent of Washington's needs are in source projects, which ensure an adequate supply of high quality water (p. 8).
  (U.S. EPA 2013)

Investing $476 million a year in rehabilitating and replacing clean water infrastructure over the next 20 years would create or sustain an estimated 9,500 jobs throughout the economy each year.[7]

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[5] Calculated using jobs number from Clean Water Council: 20,000 jobs per $1B (Clean Water Council 2009, p. 1:6) and investment number $5.3 billion as cited above annualized over 20 years.

[6] Percentages calculated from Exhibit 2.1: State 20-year Need Reported by Project Type (in millions of January 2011 dollars) on p. 18 (U.S. EPA 2013).

[7] Calculated using jobs number from Clean Water Council: 20,000 jobs per $1 billion (Clean Water Council 2009, p. 1:6) and investment number $9.5 billion as cited above annualized over 20 years.

Investment in water infrastructure creates direct jobs through the replacement and upgrade of pipelines, treatment plants, storage tanks; and the installation of new green infrastructure projects and the new and retrofitted gray water systems used for water reuse and recycling, hot water circulation, and rain water catchment (BlueGreen Alliance 2012, p. 2). These projects drive demand for equipment and materials, creating indirect jobs in manufacturing, transportation, and logistics.

Jobs created and maintained include the following: construction, steel and iron inputs, pipe fabrication, manufacturing equipment and machinery, heavy equipment operations and truck transport, architecture and engineering services, landscaping design and installation, technical equipment and instrumentation (BlueGreen Alliance 2012, p. 3).

ENERGY

The ASCE report *Failure to Act: The Economic Impact of Current Investment Trends in Electricity Infrastructure* notes that America's current electricity infrastructure is a complex patchwork system of power plants and transmission lines of varying ages, capacities, conditions, and capabilities (ASCE 2011a, p. 4). The report found that aging equipment can lead to intermittent failures in power quality and availability, and that capacity of equipment explains bottlenecks in the grid that can lead to brownouts and blackouts (p. 4). Deficiencies in generation, transmission, or distribution can affect economic growth and our standard of living (p. 10). Electricity demand is expected to increase over the long term, and increased investments will be required in order to have reliable electricity in the future (p. 4).

Similarly, investments to modernize the natural gas distribution system will increase efficiency; these efficiency improvements will keep methane in the system, create jobs throughout the economy, and save ratepayers money.

A key component of a clean economy is the development and production of renewable energy. Expanding these markets in the United States has enormous potential to create good jobs while reducing climate pollution and our dependence on foreign sources of energy — building a cleaner, more efficient and more competitive American economy.

However, it's not enough to invest in these industries alone. We must ensure that these good, high-paying jobs are created here in the United States. From the manufacturing of the component parts and the panels, turbines, and power plants themselves, to construction, installation, maintenance, and operation of these renewable energy systems, our nation stands to gain from smart policies and strategic investments that build a clean, renewable energy economy right here in the United States.

ELECTRICITY

As previously noted, Washington is committed to reducing carbon emissions in the electricity sector through investment in renewables and efficiency: Washington's current Renewable Energy Standard goal is 15 percent renewables by 2020 and also includes all cost-effective conservation (DSIRE 2013). Transmission projects and other electricity infrastructure investments are needed to support these new renewables; for example the Bonneville Power Administration is planning to build the Central Ferry-Lower Monumental transmission line in southeast Washington that will travel 38 miles connecting two substations, allowing distribution of increasing amounts of renewable energy from nearby wind farms. The project is also expected to create up to 170 direct jobs (T&D World Magazine 2011). The project is expected to cost $90 million (WECC 2011); construction is scheduled to begin in spring of 2014 and end December of 2015 (U.S. DOE 2013).

Investing $90 million on the Central Ferry-Lower Monumental transmission line will create or sustain an estimated 1,170 jobs throughout the economy[8].

Investment in electrical grid infrastructure creates jobs in construction, design and engineering, and project management to build transmission lines, towers, and substation structures, transformers and switch gear. These projects drive production of materials like steel, aluminum, and other building materials like concrete and gravel (Pfeifenberger & Hou 2011, p. 19).

NATURAL GAS

In 2012, the Washington Utilities Transportation Commission (WUTC) directed the state's four investor-owned natural gas utilities to survey their pipelines and propose plans for replacing lines determined to have "elevated risk." Regulators incentivized the survey by allowing the utilities to recover their costs each year during the multi-year programs. In late 2013, the WUTC approved almost $700 million in long-term, multi-year plans for to upgrade their pipeline systems by replacing more than 522 miles of pipe over the next 30 years (Nemec 2013). Cast iron /bare steel pipe leaks 18 times more gas than plastic pipes, and 57 times more gas than protected steel pipelines. [9] Ideally, ways could be found to accelerate repairs to Washington's existing natural gas distribution lines in order to derive economic benefits and avert natural gas losses sooner. Methane has a much higher near-term climate impact than carbon dioxide, at least 80 times the global warming potential over 20 years on a pound for pound basis with carbon dioxide. Repairing and replacing these existing 522 miles of pipes with protected steel pipelines could create and support an estimated 886 jobs throughout the economy;

[8] Calculated using Working group for Investment in Reliable and Economic Electric Systems (WIRES) jobs number 13,000 full-time-equivalent ("FTE") years of employment per $1 billion of U.S. transmission investment (Pfeifenberger & Hou 2011, p. ii) and investment number $90 million Central Ferry-Lower Monumental transmission line project cost as cited above.
[9] Based on EPA leakage factors in the Code of Federal Regulations, 40 CFR 98, Subpart W (U.S. GPO 2014).

were these investments able to proceed quickly, economic and employment benefits would accrue sooner.

Replacing the 522 miles of "elevated risk" natural gas pipelines with protected steel pipes would create or sustain an estimated 886 jobs throughout the economy. Accelerating these repairs could hold even higher job creation and methane reduction benefits[10]

Investment in repairing pipeline infrastructure creates and maintains construction jobs for pipefitters, welders, equipment operators, truck drivers, laborers, inspectors, iron workers, electricians, and others (Black & Veatch 2012, p. 2-7). These projects drive demand for materials and equipment like pipe and valves as well as surveying services, legal services, financing, food service, and others (Black & Veatch 2012, p. 3-1).

COMMUNICATION

Smart Grid

According to a 2009 report from the Information Technology & Innovation Foundation (ITIF) titled *The Digital Road to Recovery*, Smart Grid technology utilizes sensors and advanced information technology (IT) to create two-way communication between electrical power producers and consumers, allowing producers to better understand and respond to supply and demand using real-time data (Atkinson et al. 2009). Not only does smart grid technology increase the efficiency and reliability of the electrical grid, it also generates many societal benefits—including lowering peak demand—allowing for more distributed generation and renewable power sources, and enabling the use of new technologies like electric vehicles (Atkinson et al. 2009, p. 12).

In 2009, the American Recovery & Reinvestment Act (ARRA) provided funding for several types of smart grid projects through the U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability. One example is the Smart Grid Infrastructure Modernization of Electrical Distribution System in Snohomish County, which was funded to upgrade substations with automated controls in order to enhance performance and reliability of the entire distribution system (U.S. DOE 2012).

Currently, projections from the Edison Foundation's Innovation, Electricity, Efficiency Institute (IEE) indicate that, by 2015, between 15 and 50 percent of Washington end-users are expected to have smart meters (IEE 2013, p.2). The ITIF report mentioned above cites a 2007 study that found the average advanced metering project cost was $775 million and took slightly longer than 5 ½ years to install roughly 2.2 million meters (Atkinson et al. 2009, p. 13). If a utility in Washington were to do one

[10] Jobs number calculated based total 522 miles of pipeline to be replaced (Nemec 2013) and assumption of replacing with protected steel pipe, calculated using *Market Sizing- Natural Gas Distribution* Excel spreadsheet (McCulloch 2014).

of these average projects to increase smart grid infrastructure build out in the state, more than 18,500 jobs could be created or maintained.

Investing $140 million in smart grid advanced metering infrastructure build out per year for 5 ½ years would create or sustain an estimated 3,300 jobs throughout the economy each year.[11]

Investment in expanding smart grid infrastructure creates grid design and construction jobs including laying new pipes and wires, equipment operation, and labor as well as creating jobs for upgrades and repairs to transmission and distribution lines. These direct jobs drive creation of indirect jobs to supply materials and components for hardware such as sensors, smart meters, substation automation equipment, and information technology equipment like networking equipment and servers as well as related software (Atkinson et al. 2009, p. 14).

SUMMARY

Washington's infrastructure systems are in urgent need of repair—as this report shows, roads and bridges, water, waste water, transit, energy, and communication systems need increased investment to become efficient, safe, and productive for Washington residents.

Failure to repair, maintain, and bolster infrastructure systems has serious consequences for Washington:

- Insufficient surface transportation systems cost consumers and businesses money, reduce productivity and competitiveness of Washington businesses, and cost jobs in the economy.
- Failure to repair and maintain water infrastructure can result in unreliable water service, inadequate wastewater treatment, inadequate capacity, and pollution—leading to higher rates, increased medical costs, and environmental damage.
- Insufficient electricity infrastructure leads to bottlenecks, intermittent failures in power quality and availability, brownouts, and blackouts and putting Washington's quality of life and economic vitality at risk. Additionally, fewer renewable electricity sources can be incorporated into an aging system without investment in modernization.
- Insufficient natural gas pipeline infrastructure can lead to damaged pipelines, adding to monetary, environmental, and climate costs.

Repairing Washington's infrastructure creates good jobs and positively affects business productivity, competiveness, and efficiency—saving money, energy, and other resources as well as reducing greenhouse gas emissions that lead to climate change. Additionally, resilient transportation, water,

[11] Calculated using the jobs number from (Atkinson et al. 2009, p. 2) and assuming numbers for an average project as reported in Atkinson et al.: investment number $775 million (Atkinson et al. 2009, p. 13) over 5 ½ years.

energy, and communication systems can help communities to increase public safety and withstand increasingly occurring severe weather events and super storms.

Repairing Washington can reverse the worst impacts of climate change, prepare communities statewide, and strengthen the state's economy. An estimated 77,900 jobs could be created across the Washington economy by making much-needed investments in our basic infrastructure systems; jobs installing, maintaining, and renovating infrastructure systems as well as jobs manufacturing and transporting components, equipment, and materials.

SOLUTIONS: FINANCING AT THE LOCAL, STATE AND FEDERAL LEVELS

Public funding alone is unlikely to be sufficient to address infrastructure concerns. Innovative funding mechanisms must leverage consistent government support with the capabilities of private investment. This section provides some examples of financing mechanisms to support the necessary infrastructure repair and investment for Washington as illustrated by this report.

Infrastructure Banks and Energy

Modernizing American infrastructure will require new levels of strategic funding across a broad range of sectors. Infrastructure banks utilize public resources to unlock private investment and are new approach to drive capital into 21st century infrastructure projects. The *National Infrastructure Development Bank Act of 2013*, introduced by Congresswoman Rosa DeLauro (D-CT), is a federal example of this model. According to a press release from the BlueGreen Alliance, the National Infrastructure Development Bank would provide financial products such as loan guarantees to attract private funding for projects in energy, transportation, water and telecommunications that increase the efficiency of these systems and create good jobs (BlueGreen Alliance 2013). State examples of development banks include New York's recent "Green Bank", aimed at reducing market barriers to clean and efficient energy projects. As reported in a press release from Governor Cuomo's office, it is estimated the New York Green Bank will double the capital available in five years, and increase by 10-fold after 20 years (Governor Cuomo's Press Office 2013).

Transportation

Infrastructure banks can be utilized for sector-specific projects, as well. One example outlined in the Apollo Alliance report *Make it in America: The Apollo Clean Transportation Manufacturing Action Plan* is the Transportation Infrastructure Finance and Innovation Act, or TIFIA, program, which provides federal credit assistance to surface transportation projects of national and regional significance (Apollo Alliance 2010, p. 6). Additional potential exists to rebuild the domestic manufacturing sector while simultaneously repairing or building new infrastructure if preferences or incentives for projects utilizing vehicles and equipment with higher domestic content are put in place (Apollo Alliance 2010, p. 7).

Water

Federal infrastructure programs, such as the state revolving funds (SRFs), help close the funding gap for infrastructure. According to the BlueGreen Alliance *Joint Policy on Water Issues*, the Clean Water State Revolving Fund has leveraged more than $74 billion in water infrastructure investment, creating 1.4 to 2 million jobs through the U.S. economy (BlueGreen Alliance 2012, p. 3). The policy also notes that attaching domestic sourcing provisions to these taxpayer-sourced investments would promote technology and innovation in the U.S., create quality jobs, and deliver the highest benefit to the taxpayers and the economy (p. 3).

Utilities

Modern infrastructure facilitates the efficient, reliable and dynamic use of energy. Due to the regulated nature of gas and electric utilities, rates are charged to the customer to support both the cost of energy and the infrastructure built to deliver it. These rates are set in advance, and are adjusted in a rate case before a public service commission. Often, this element makes it difficult to implement and finance infrastructure investments. According to a recent report from the Conservation Law Foundation, tools such as Targeted Infrastructure Replacement Factors (TIRFs) allow a utility to track capital investments and recover the costs more quickly than through a traditional rate case. These mechanisms are approved by a public service commission and shorten the timeline for repairs (Cleveland 2012, p. 11).

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