

Sustaining Our Nation's Infrastructure: The 9th Annual Energy & Construction Best Practices Summit

Summary of Proceedings

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The Washington State University Energy Program (WSU Energy Program) is a recognized leader in energy research, development and technology transfer. The WSU Energy Program works with government agencies, power marketers, utility consortiums, educational institutions, private businesses and industries on projects that promote energy conservation, research, development of renewable energy sources, and economic and workforce development.

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SUSTAINING OUR NATION'S INFRASTRUCTURE



9th Annual Energy & Construction Best Practices Summit: *Sustaining Our Nation's Infrastructure*

Summary of Proceedings

INTRODUCTION

The Annual Energy & Construction Best Practices Summit was held for the ninth time on June 18, 2014, at Centralia College. The over-arching topic for this day-long professional development event, which is an annual forum for technology transfer, knowledge-sharing, partnership and solution development, was climate change: Learning the current state of scientific research on climate change, including its current and predicted effect on the environment, economy and society. A key focus of the Summit was to explore how industry, workforce education, organized labor and government partners can work together to reverse the effects of climate change, and adapt to its impacts.

Energy, construction and advanced manufacturing were the focus industries for the Summit meeting. While each industry sector has unique needs and challenges associated with climate change, together these industries share many of the same competitive pressures, technologies and infrastructure. Similarly, these industries are poised to help manage and adapt to the effects of climate change, and contribute to reversing its impacts.

While advanced technologies, enhanced infrastructure and effective management practices are desirable and necessary, each of these industries must rely on employees at all levels to achieve these goals. Indeed, a central assumption of the Summit is that each of these industries and the state as a whole will require a state workforce that has acquired the level of world class technical and leadership skills needed to address the many challenges posed by climate change.

More than 150 attendees participated in Summit presentations, workshops and events. They represented a broad range of stakeholders, backgrounds and perspectives, including labor, industry, government, and education. Together, participants spent the day learning about the implications of climate change for the clean energy, construction and advanced manufacturing industries, and for their workforces. Participants were heavily engaged in workshop discussions and breakout sessions that focused specifically on the implications for each of the three industries.

The Summit culminated in sharing ideas generated during the presentations and workshops, and guest speakers identified common themes and action plans and solutions that participants and subject matter experts believed would produce positive outcomes for Washington state's economy, environment, communities and citizens. This report provides a summary of the Summit outcomes and documents the major ideas and solutions that were discussed and proposed as potential action steps. To access the full Summit agenda, list of presenters, presentation materials and other information, see: <http://cleanenergyexcellence.org/summit/>

Background

Research Confirms Climate Changes: Recent global and national reports integrating a large body of climate research underscore conclusions among leading scientists that effects of climate change are already upon us, and that future climate-based challenges to our economy, environment and society are not just a possibility, but a certainty. Central to the climate change discussion are two important policy questions: How should we move to reverse the anthropogenic causes of climate change; and, how can we adapt to the increasingly-challenging environmental, economic and social conditions we will face in the decades to come?

Washington Leads: In Washington state, these questions have long been the subject of debate. State policy discussions and action by the public and private sectors has established Washington as a national and regional leader in addressing climate change and its effects. Governor Inslee's recent Executive Order (14-04) cites additional research on the causes, impacts and effects of climate change on Washington state, and calls for additional leadership, strategies and coordinated action to reduce carbon pollution and accelerate the development of clean energy solutions.

As with prior state energy and environmental policy initiatives, the Executive Order is also significant in its continued emphasis on reducing carbon-based pollution while accelerating investment in new clean energy and efficiency research and development. New technologies, and innovative products and services that address current and future climate challenges, can simultaneously spur new economic development and the creation of good-paying 'green jobs' that will support greater social equity across the state.

Learning and Acting: This year's Energy and Construction Best Practices Summit, '*Sustaining our Nation's Infrastructure*,' provided an opportunity to hear about the latest climate research and projections, and to learn from industry and government leaders about the likely impacts on key sectors of Washington's economy, the environment and communities. Summit attendees explored the solutions and opportunities that lie in public and private-sector innovation, regional policy leadership, and how our state's education and training infrastructure and a skilled workforce will help Washington achieve and sustain a clean energy future.

What are likely to be the effects of climate change on specific industries and how will they adapt to policy changes and shifting environmental conditions? What opportunities exist for developing new, cutting-edge technologies and services that address climate change and can revitalize our economy and communities? How are state education and training providers preparing for a different future that relies on building and nurturing a talented, innovative workforce? What new knowledge, skills and competencies will help Washington achieve its environmental priorities and ensure a prosperous clean energy future for all citizens? These questions were at the core of this year's Best Practices Summit.

Program Summary

Keynote: Stand-up Economist, Yorum Bauman PhD., delivered the opening keynote address. He focused on how economic tools can be used to influence market forces to protect the environment. He outlined a strategy of increasing taxes on things we want less of, such as pollution, and lowering taxes on things we want more of, such as jobs and energy savings. He argued that a broad-based carbon tax would provide the best and most viable strategy to incentivize the use of clean energy while requiring that organizations should pay a tax that accounts for the share of carbon-based pollution that they cause. Interspersed with jokes and hard hitting facts, Dr. Bauman's remarks encouraged the audience to think about what he asserts is the major story of the century: unprecedented levels of global population growth and managing the impact of that growth on the environment.

An Executive Panel consisting of leaders from McKinstry, the Governor's office, Aerospace Machinists 751, the community and technical colleges, and Skanska USA discussed the implications of climate change for the state and their industry sectors, and ideas for action steps that they drew from Dr. Bauman's presentation. The panelists agreed that the environmental challenges are primarily about human behavior, and that a sustainable future depends on having a highly skilled workforce. In planning for action in Washington state, it was noted that there will need to be synergy between public and private policy efforts in order to integrate the needed social, economic and

environmental approaches to effectively adapt to climate change and reduce future impacts.

The Panelists agreed that there are more options for responding to the current and future environmental challenges than denying that it is happening, or hoarding resources in preparation for a global doomsday. The other options that were considered were described as “wait and see” and “do what we can”. The panelists noted that we need to act now to prevent the worst of climate change. Panelists confirmed that “do what we can” is what Washington state is now doing, by making decisions that follow the science, and by taking action. Through these examples Washington provides leadership and support to other states. Washington is doing these things by building better buildings and renovating existing buildings, producing more renewables than any other state, creating innovative clean energy technologies, enhancing the electrical grid, and investing in fuels and cars that are more efficient and have a measurably smaller environmental footprint.

The panel discussed Bauman’s assertion that we do not have to choose between the environment and economy. Panelists noted that what is needed are market-based, business led solutions that benefit both. Investments in workforce training can allow workers to be part of the solution. Regarding the resistance to change that often occurs when individuals and organizations are asked to think and behave differently, the panel noted that past efforts to strengthen worker safety standards were also met with resistance, but over time the higher standards became accepted and they proved to be very effective at ensuring employee safety and health. A similar point concerning “lean” manufacturing methods to enhance worker productivity, environmental protection and business viability, was that participation among all stakeholders is needed to achieve the desired outcomes.

Panelists shared information about very real environmental impacts that are expected in Washington state: Water rationing in some areas is expected before the end of the decade, forest fires are already more common than in the past, and some companies from the shellfish industry have moved their operations to Hawaii because the waters of Puget Sound have become too acidic.

Specific Actions proposed included:

- Shortening supply chains to decrease time, transportation and fuel costs, and to reduce related environmental impacts.
- Buying local to support local businesses and job growth, and to limit environmental and trade-transportation impacts and costs.
- Educating children, so they are aware of the impact of human and corporate behaviors on the environment, and to equip them to make career decisions and gain skills that will help them generate solutions, products and services needed to address climate change and adaptation.

- Having industrial, commercial and residential building occupants take responsibility for the built environment, which consumes a large proportion of electrical and thermal energy.
- Being intentional about the importance of engaging all stakeholders early-on to ensure good ideas, commitment and investment in actions and solutions that result in outcomes that help protect the environment while meeting business, community and individual needs.

Industry Breakout Sessions

Breakout sessions organized by industry created time for Summit attendees to further discuss specific challenges and actions that can be taken to adapt to and mitigate climate change impacts. A facilitator and subject matter experts provided opening remarks, and audience members were invited to engage with speakers regarding topics, solutions and actions steps. The highlights of each sector-specific workshop include the following:

Advanced Manufacturing Breakout Session Discussion Highlights:

- If an economic tool like Cap and Trade or a Carbon Tax get put into place, the policy will need to be developed thoughtfully so that its impact is felt equally among the state's businesses and citizens. Anything that results in further inequality or divisiveness won't work.
- There are skill gap issues in this industry for several reasons: young people are not choosing to enter the manufacturing workforce; educators are not able to keep up with the changing skill requirements so are unsure what to teach, and manufacturing now requires constant and continuous learning by incumbent workers, trainers, sub-contractors, students, and management.
- The confluence of Baby Boomer retirements, increased automation, and more focus on all students going to college rather than into a trade makes it a challenge for the advanced manufacturing employers to find and hire the workers they need.
- Experiential learning, internships and work-based learning were all discussed as possible strategies for filling the manufacturing workforce pipeline. It was mentioned the Oregon State University has a good cooperative education model in place that could be replicated in Washington. Requiring work-based learning was proposed.
- Participants noted that conversations about STEM education seems to assume that those students will be on a path to earning high levels of academic credentials (four-year degrees and above) so the importance of STEM education for sub-baccalaureate education and workforce training is often overlooked.

Energy Breakout Session Discussion Highlights:

- Efficiencies directly affect the bottom line in a positive way, but building owners don't currently see the need to pursue energy efficiency. Stronger incentives and policies/requirements are needed.
- To achieve our energy goals, new ideas are needed. This will mean bringing new people into the field and building on the diversity of our growing population to solve the energy challenges we face.
- Need to re-emphasize the value and dignity of manual labor. Our education system no longer supports these skills, as demonstrated by the large number of cuts among vocational programs. In order to prepare the required workforce, technical education needs to start early, in the K-12 system, and then have more advanced programs at the colleges. Internships are needed as part of each community college program.
- How will retirees pass along their skills and knowledge before they depart? Will employers be able to hire new people to be trained before the retirements occur? How much ramp up time will be required to replace those people with years of experience?
- Younger workers have strong technology skills and are able to keep up with technological changes well. They do need training in soft skills such as punctuality, team work and interpersonal communication. As one person noted, "We need to hire for attitude, train for skills."
- Many of the emerging occupations require an integrated set of existing skill sets such as a combination of line worker, computer, data analysis skills and also energy efficiency expertise.
- Hiring veterans is a good way to get someone with established skill sets that can be built upon.
- Energy and sustainability programs at community colleges need to have permanent, paid directors; to be effective these programs cannot simply rely upon volunteerism or temporary grant funding.

Construction Breakout Session Discussion Highlights:

- Climate change can be viewed as an economic opportunity. We need to focus on solutions and outcomes, and no solutions should be off the table.
- Life cycle thinking is needed and is a tool that can move the agenda forward.
- The morning 'executive' panel represents all the partners who need to go forward as a team to appeal to the legislature to support and implement solutions. Those actual panelists could sit together in a room and make agreements that would move us forward to help reverse and adapt to climate change.

- Workers of tomorrow need to know how systems are integrated and work together. Systems thinking should be taught. The construction industry may be the last to recognize how essential integration is; craft people now need to know more than one craft.
- Apprenticeships now include blended learning, soft skills education and big picture (systems-level) thinking.
- Craft workers need to be invested in the overall solution, and to be empowered to see themselves as part of the solution.
- There are opportunities for people in construction occupations to feel that they are saving the planet if they understand the power of energy efficiency. If this happens, the trades will attract more young people to their field.
- 30% of the cost of buildings is in their construction; 70% of the cost is in building operations and maintenance. We need to change the culture of construction to think about buildings in the long-term.
- Building maintenance will become a higher priority in the future. Facilities managers are on the ground and in a good position to alert property managers about energy saving solutions.
- The building code is the thing that brings owners, architects and structural engineers together. If we are serious about change, we need to change building codes.
- There are very few incentives in place for energy efficiency.
- As long as government projects continue to base their selection process on “low bid wins”, buildings will be built to cut costs, not to be efficient in the long run. The government bidding process sets that standard for the industry. Government can lead the way by changing this approach. As an industry, we need to demand that factors other than cost drive our processes.

Wrap-Up Session: After each of the facilitators from the breakout sessions reported out the highlights of their conversations, Pat McCarty (Tacoma Power), and Martha Henderson (The Evergreen State College), summarized what they gleaned from the discussions throughout the Summit.

- Population diversity means we must have better means of communication and recognition of multiple cultural perspectives - also hiring across gender and cultural boundaries.
- Engage students of all ages through experiential education - more hands-on and applied learning. Work-based learning needs to be required.
- Address issues through integrated systems thinking - avoid isolation between important players.
- Develop partnerships across sectors.
- Emphasize life-long learning and capacity for developing new skills in sustainability.

- Challenges associated with climate change need more than just a quick fix. We need to prepare ourselves and our workforce to make the needed changes.
- Military veterans are a resource to addressing the workforce challenges since they have many of the needed traits and skills in place.

Major Themes and Actions

After these industry focused conversations, report-outs were made during the closing plenary session, where major themes and action steps across the three industry sectors were identified by facilitators. Themes included:

Workforce: It was agreed by Summit presenters and participants that there is a need to prepare the workforce and ourselves for a future in which climate change will affect employers and employees, and where industry's needs will change as they respond to economic opportunities and solutions designed to help reverse, mitigate or adapt to the effects of climate change. The discussion focused on up-skilling the current workforce, as well as preparing (and preparing for) the future workforce.

- As manufacturing processes become more automated and incorporate new materials such as composites, new skills are needed by the workforce. The ubiquity of technology in every field means that workers need to incorporate more and different Information Technology (IT) skills into their repertoire.
- In addition to the technical and skill-based changes that are occurring, the expected high rates of retirement and demographic trends will force the education and training system to prepare a diverse range of students for the workforce.
- Breakout discussions for each industry touched on the need for more applied, contextual and experiential learning experiences for students. Each group suggested that Work-based Learning should be a required part of educational programs and that industry partners should be encouraged to be part of the educational process.
- Since problems faced in the workplace now involve multiple systems and disciplines, it was suggested that teaching systems thinking needs to happen at the high school and college levels. One approach that was suggested is Life Cycle Thinking which emphasizes lifecycle analysis, but also life-long learning and the capacity for developing new skills in sustainability.
- As changes in the workplace continue to accelerate, workers need to be prepared to operate in an environment that demands continuous learning. Employees need to have the willingness to learn, and opportunities to obtain further training. While potential workers may not yet have the specific skills an employer needs, employers should look for foundational employability skills, including a good attitude and willingness to learn, among their new hires.
- Military veterans were repeatedly cited as being able to build on existing skills and to continue to learn as needed. There is now a global challenge for jobs and

for employees. The more skills and training our workforce have, the more value they can add.

Population Growth: The world population has grown rapidly in the last 20 years and high growth rates are expected to continue. This is putting intense pressure on existing resources and contributing to the climate change problem. All of these people will need to be trained to be part of the solution process for addressing climate change.

The increasing diversity of our population means we must be willing to train and hire across gender and cultural boundaries in order to meet the growing demand for skilled employees. We can no longer afford to leave anyone behind.

Retirements: 25% of all baby boomers will be retiring within the next 6-10 years. The pipeline to replace these retiring workers is not yet in place, and attracting the future labor force into these industries and occupations will be challenging. Young people are interested in being connected to sustainability initiatives, and many students view the energy system as potentially “green.” We should capitalize on that interest to develop responsive programs and market preparation for careers in these industries and key occupations, and to recruit, retain and develop new and existing employees in our businesses.

Public Private Partnerships are Essential: There is a need to develop working relationships with partners across different industry sectors and stakeholder groups. It was suggested that the constituents represented by the Executive Panel – government, labor, industry, education – should be working together to formulate policy proposals that address climate change issues. Specific policy areas that were discussed included:

- How to realize more efficiencies in the built environment.
- Ways to reduce and eliminate our dependence on coal.
- How to make electric vehicles more affordable.
- In the built environment, it was proposed that government needs to invest in more deep retrofits, and that building operators need to take more responsibility for their operating costs.

Systems Thinking: Related to the idea of cross-sector partnerships to address policy issues, it was suggested that systems thinking is needed to solve the climate change problems. The first step is to get the partners to work together, invest more in design work upfront on building projects and to build buildings with a focus on the people who will be in the building thirty years from now. In order to see change, decisions need to come from bottom up not from bottom line. Issues should be addressed through integrated systems thinking which includes, not isolates, important players

Leadership: Leadership at all levels is needed to address the climate change challenges. Business, labor government and education need to take jointly-sponsored policy proposals to the legislature. Leaders need to empower craftspeople to see themselves as part of the solution to climate change mitigation and adaptation, working together across all levels of organizations to find ways to be more efficient, effective and green. For their part, businesses need to seize opportunities for the development of innovative new products, services and solutions that are responsive to the future economic, social and environmental changes we will face.

Economic Justification for Action: As proposed by Yorum Bauman in his keynote address, economic tools can be used to help protect the environment without weakening the state's economy. In fact, efforts to reduce climate change or adapt to its effects can present business opportunities that can make our economy more robust: If the US can stay ahead on research and development, we can create new products, new companies and new jobs. Any development of low carbon technologies can be monetized by selling them domestically, but also globally to other countries such as China where there is a growing need for technology solutions that work. Investing in renewables is one opportunity, but promoting greater energy efficiency in the built environment is an immediate, effective and lower-cost strategy to address climate change while also enhancing the profitability of many companies and creating new jobs.

Next Steps – Think Big, Start Small

Summit participants and subject matter experts provided some additional input on changes the state should consider that they deemed important to addressing the effects of climate change and that would help enhance the state's ability to achieve its economic, environmental and social equity goals. They include:

Cross sector partnerships should work together to create and promote innovative, shared solutions and policy proposals that they can jointly present to the legislature for consideration. Broad-based stakeholder support for specific actions and solutions is a powerful strategy for promoting policy and regulatory changes that can benefit all parties and help the state address the effects of climate change in ways that enhance the state's economy, environment, communities and the workforce.

The state building code is fundamental to driving new behaviors in the private and public sectors and for enhancing cooperation and participation among building owners, architects, structural engineers and government. Further enhancements to state building codes should be examined to identify new opportunities for reducing energy use, greenhouse gas emissions and to incorporate environmentally-friendly materials

and processes that improve building performance. Building codes that improve workplace conditions and productivity of building occupants should also be examined.

Government projects based on “low-bid wins” negatively influence project priorities and the way other projects are evaluated. Work is needed to change the public-sector bid process to emphasize priorities that encourage long-term investment and performance. The focus on lowest bids detracts from investments in new building designs, improved methods and materials that are energy and resource efficient, environmentally-friendly and focus on long-term performance and value. Industry and the public sector can benefit from looking beyond the immediate bottom-line when investing in capital projects.

Washington is a recognized leader in energy efficiency, but there exists many additional opportunities to achieve greater efficiency in all sectors of the state’s economy. There is an ongoing need to develop and implement more and more effective incentives to support future energy efficiency goals across the state.