FINAL REPORT OF THE LR 455 SPECIAL COMMITTEE
TO CREATE THE FRAMEWORK FOR A STATE CLIMATE ACTION PLAN

Co-chairs

Senator Ken Haar, District 21

Senator Tyson Larson, District 40

Committee Members

Senator Ken Schilz, District 47

Senator Heath Mello, District 5

Senator John Stinner, District 48

Senator John Kuehn, District 38

Senator Patty Pansing-Brooks, District 28

Executive Summary

A special committee was created by the adoption of LR 455 by the 2016 Legislature to examine issues related to a plan to address the impacts of climate change for Nebraska. Senators Ken Haar and Tyson Larson were the co-chairs. The other members were Senators Heath Mello, Ken Schilz, Patty Pansing-Brooks, John Stinner and John Kuehn. The primary charge of the committee was to create the framework for a climate action plan for the State of Nebraska.

The committee's work was based in large part on scientific research carried out by the University of Nebraska-Lincoln (UNL). In 2014, UNL researchers created a report entitled "Understanding and Assessing Climate Change: Implications for Nebraska." In 2015, eight roundtables were conducted as a follow up to that report. Both the UNL report and the report from the roundtables recommended a climate action plan for the state. The 2015 Nebraska Rural Poll found that 61 % of rural Nebraskans supported the creation of a climate plan. As the UNL report stated: "Action now is preferable and more cost-effective than reaction later."

The committee focused on certain issues with the intent of providing a basis for further legislative action. There was one recommendation which received universal support throughout the process, which was the need to create a climate action plan for the State of Nebraska.

Legislative Recommendations Adopted by the Committee

Overarching recommendation, Adopted 7-0

Authorize a legislative climate planning committee to create an evidence-based, data-driven state climate action plan

Further Recommendations for Legislation

- Expand PACE (described on page 4) authorization to include counties; make it easier for communities to create a PACE network; Adopted 7-0
- Remove restriction that prevents Tesla from having a sales and service network in Nebraska; Adopted 7-0
- Authorize wind friendly counties; Adopted 6-1
- Authorize and standardize virtual net metering for community solar projects; Adopted 6-1
- Authorize self-driving vehicles; Adopted 7-0

Recommendations for Study, Adopted 7-0

Change Department of Roads to Department of Transportation

Incentives for agriculture to reduce carbon emissions, including:

- Carbon capture
- High value crops
- Industrial hemp
- Practices and technologies that reduce water and fertilizer use
- Methane capture

Energy

- Optional statewide siting matrix for wind development
- State production tax credit for renewable energy
- Incentives for solar energy
- Reduce or simplify regulations related to renewable energy

Future technologies

- Research next generation nuclear technologies
- Research viability of thorium reactors
- Incentives for battery storage
- Smart grid

Study the following related to the Nebraska Environmental Trust:

- Potential changes to funding categories
- Ability to loan money
- Expedited block grants for well-established technologies
- Ability to fund major research projects

Summary of Research and Activities

State Climate Action Plans

Thirty-four states have adopted climate action plans as of 2016. They range from being very prescriptive, such as California, which sets goals for renewable energy and greenhouse gas emission reduction, to descriptive, such as Colorado, which describes risks and challenges from climate change and provides options for responding to them. Given Nebraska policy-makers' historical opposition to mandates, it makes sense for our state plan to be descriptive, and to provide options for response.

One of the fundamentals of the committee was to examine both risks and opportunities. For example, there are serious risks from the projected increase of extreme weather events such as floods and drought. Proper planning is needed to be able to reduce their impact. On the other hand, it is important to recognize the positive impacts from climate change. One purpose of a plan would be to develop policies that recognize resources which can be utilized to provide advantages that benefit Nebraska and its people.

Committee Hearings

The LR 455 Committee held 4 hearings on 5 topics. The first two hearings were held in Broken Bow and Lincoln on September 27th and 28th on the topics of energy financing, particularly PACE financing, and solar energy development. The third hearing was held in Lincoln on October 21st on climate action plans and greenhouse gas reduction strategies. The final hearing was held November 10th in Lincoln on the role of postsecondary education in climate planning.

PACE Financing

The primary focus of the energy financing hearing was on PACE, or Property Assessed Clean Energy. LB 1012, passed by the 2016 Legislature authorizes municipalities to create PACE programs. PACE is a funding mechanism that can be used by homeowners and businesses to invest in energy efficiency and renewable energy improvements which can be paid off by an assessment on the property. PACE has been successfully used in several other states.

Many people want to reduce their energy bills through energy efficiency or renewable energy improvements but cannot afford the upfront costs. PACE provides a mechanism to overcome this problem. Two significant aspects of PACE financing that make it attractive: 1. Allowing the improvement to be paid through property taxes allows a longer term for paying off the costs, and 2. Many PACE programs utilize a one-stop

shop that takes care of financing, construction and billing in one process, eliminating many of the red tape challenges that discourage people from making such investments.

At this point, no Nebraska municipality has begun a PACE program, although several have indicated interest. The primary recommendations related to PACE were to expand it so that counties may also utilize this mechanism and to make it easier for communities to join forces to create economies of scale.

Solar Energy Development

There is a great deal of interest in solar energy development in Nebraska. To date, there has been very little solar development in Nebraska in comparison to other states. At the end of 2015 there was approximately 1 MW total solar development in the state. By the end of 2016 there will be an increase of more than 6 MW, highlighted by the Lincoln Electric System's 3.6 MW solar array and several projects in Custer County that total approximately 2 MW. Projects currently in the works are likely to increase the amount of solar development by more than 10 MW in 2017.

Much of the interest in solar development has focused on community solar projects. The concept of virtual net metering, in which members of the community invest in a project and receive credits on their bills, was one of the ideas presented to the committee. Other suggestions included increasing the authorized capacity for net metering projects and reducing the red tape involved in financing renewable energy projects.

Climate Action Plans

One of the fundamentals of a climate action plan is establishing a baseline and benchmarks for action in order to assess progress. Conducting an inventory of greenhouse gas emissions is a typical preliminary step. Although there are greenhouse gas emissions reports from power plants, there are many other sources of emissions that need to be included for the state to understand how this issue can be addressed. Collecting data about climate history and trends in the state are also important for planning, including trends for air temperature, soil temperature, precipitation and soil moisture.

Risk analysis is also a fundamental for good planning. For example, we have recently seen more frequent and severe rain events in Nebraska. Current assessments project an increase of such events. Proper planning to retain or channel flood waters can significantly reduce the damage from flooding. Similarly, the 2012 drought had a huge impact on the entire state. Droughts of this magnitude are projected to increase in both occurrence and severity. Proper planning can help mitigate the impacts of drought.

Greenhouse Gas Emission Reduction

Renewable energy and energy efficiency are generally considered the primary means of reducing greenhouse gas emissions in the power sector. Testimony at the hearing

focused on infrastructure projects that could be used to support energy developments with lower carbon footprints and electrifying the transportation sector. Since major infrastructure projects tend to be quite controversial, there is no attempt to summarize a single viewpoint on this issue. On the other hand, there is consistent strong public support for increasing investment in renewable energy, including more than 80 per cent support in the 2015 Rural Poll.

Because more than one-fourth of emissions come from vehicles powered by petroleum based fuels, it makes sense to consider the potential of electric vehicles to reduce emissions. Testimony focused on the following: 1. Potential for the state and political subdivisions to save money by using electric vehicles because of significantly lower fuel and maintenance costs; and 2. Need to develop charging infrastructure for electric vehicles throughout the state, and for that infrastructure to represent the best technology available. The Volkswagen emissions settlement fund could be a funding source to develop this infrastructure.

The Role of Postsecondary Education in Climate Planning

This hearing covered a wide range of topics. The array of climate resources at UNL, including the State Climate Office, the National Drought Mitigation Center and the High Plains Regional Climate Center in the School of Natural Resources is noteworthy. Climate research and teaching activities in the College of Arts and Sciences and climate response education by the College of Engineering and College of Architecture are also significant. Outreach activities by UNL extension educators and Biological Systems Engineering described collaborative approaches to help farmers and ranchers respond to the impacts of a changing climate. Climate response work at other campuses is also noteworthy. UNO, private institutions and community colleges provided information about significant efforts to educate their students about climate change while taking steps to improve the carbon footprint of their facilities.

There were three overarching themes of the hearing: 1. Postsecondary institutions are engaged in a wide variety of research, education and outreach efforts related to climate change. 2. The University of Nebraska was identified as having the background, staff resources and expertise on Nebraska climate issues to create a climate action plan for the state. 3. Planning efforts should be based on empirical evidence, Nebraska-based data and scientific research. Prior state drought planning processes were described as a model for a climate planning effort. Although having the University create a climate plan would require funding, it would likely be less expensive than hiring an outside consultant because of its pre-existing resources in areas that may be impacted by climate change. In addition, polls have consistently shown that Nebraskans trust the University as source for accurate information.

Information collected related to this hearing is available as a separate PDF. (to be provided later)

Sector Impacts

The 2014 UNL report identified certain sectors that would be impacted by climate change and the roundtables generally followed that format. The sectors that follow are modified slightly in response to input from the hearings.

Agriculture

Agriculture is vital to Nebraska, the number one industry and engine of economic well-being for the state. It is vulnerable to changes in temperature, precipitation, growing seasons and weather events. Agricultural production is a significant source of greenhouse gas emissions as well as providing a major, economically viable method of carbon sequestration. Use of methods such as no-till cultivation and sophisticated monitoring systems can reduce inputs, emissions and costs while increasing productivity and profitability for producers. Drought in other regions may provide opportunities for Nebraska farmers and ranchers to plant higher value crops that take advantage of Nebraska's superior water resources. A good climate plan could give Nebraska agricultural producers advantages in responding to the needs of the 21st century.

Water Resources

Water is one of Nebraska's most valuable resources. We have one of the world's largest freshwater aquifers and numerous surface water resources that are vital for agriculture, industry, domestic use and recreation. It will become more valuable as water resources in other parts of the world become more stressed through heat, drought and the need to feed the world's growing population. Nebraska has more irrigated acres than any other state in the country; the need for water in agriculture will increase as temperatures increase. Water is also vital for all other aspects of society, including domestic use, energy production and industrial use. Fortunately, Nebraska has developed forward-looking water policies that recognize the inter-relationship of ground and surface water and create procedures for management of competing demands. It is important that water policies are updated to respond to reflect the demands of changing climate.

Energy

The energy sector generally receives a great deal attention in climate planning because large fossil fuel power plants generate significant amounts of greenhouse gases. The energy sector also represents major opportunities for Nebraska. Nebraska will have more than 1,300 MW of wind development by the end of 2016. This will generate approximately $6 million in property tax revenues and an equivalent amount in lease payments to farmers and ranchers. At a time when the State is facing a revenue shortfall of more than $900 million, all reasonable options for economic development need to be considered. The fact that Iowa has developed more than 6000 MW of wind

energy and plans to develop another 1000 MW despite the fact that Iowa has lower quality wind resources means that Nebraska has considerable room to grow. It has been projected that the passage of LB 824 by the 2016 Legislature will generate more than $1 billion in investment in the state. Wind power has also been shown to be a low-cost energy source. Many utilities, including public power districts in Nebraska, are taking advantage of its low cost. Methods of encouraging wind development deserve consideration, including siting standards and preferred wind development zones. As previously noted, solar development is just getting started in the state and may need incentives to encourage power districts, communities, businesses and homeowners to invest in it. Nebraska's agricultural industry has been a major source of biofuels and has provided significant benefits to our economy. New biofuels that require less water and fertilizer and are produced from plants that are not also a source of food could provide both economic and environmental benefits in a hotter and drier world. Nebraska's livestock industry produces significant amounts of methane which could be captured as a fuel source.

Health

Climate change is likely to have serious impacts on public health and health care. Periods of extreme heat are very dangerous for vulnerable populations such as the elderly and people in poor health. Droughts increase particulate matter in the air, which aggravate pulmonary diseases such as asthma. Illnesses caused by vectors such as the mosquitos that carry the Zika virus and ticks that carry Lyme disease are being found in new places. It is important for medical professionals to understand how these factors can impact their patients. It is also important for public health officials to understand climate change impacts so they can communicate appropriate messages to help their communities become more resilient.

Communities

Communities need to be able to respond to the multiple potential impacts of climate change. These include being prepared to respond to weather events such as floods that exceed historic records, public health planning and plans to respond to water shortages and energy stresses. On the positive side communities that develop sustainability plans and invest in renewable energy are attractive to millennials and 21st century businesses like Google and Facebook.

Transportation

Transportation can be an important part of planning to respond to climate change. As discussed previously, electric vehicles can significantly reduce emissions while reducing maintenance and fuel cost. Trains can transport more freight with fewer emissions than trucks. Mass transit can reduce the number of automobile miles. Urban planning that incorporates foot and bicycle traffic as part of its transportation plan can provide many benefits to the community, including reducing emissions. One suggestion was to change the name of the Department of Roads to the Department of Transportation to

better reflect the multiple modes of transportation. Self-driving or autonomous vehicles are being developed and receiving authorization in some other states. Properly developed, self-driving vehicles could make travel safer and more energy efficient.

Wildlife and Ecosystems

Wildlife and ecosystems, like agriculture, are very vulnerable to climate change impacts. Wildlife populations are dependent on ecosystems that are sensitive to changes in temperature and precipitation. Droughts may cause habitat to become uninhabitable. New disease vectors and stresses may increase the spread of disease. Since hunting, fishing and ecotourism such as crane watching provide major economic benefits to the state, efforts to increase resiliency of habitat and wildlife populations can provide significant economic value. In addition, grasslands and forests can reduce the impact of greenhouse gas emissions by capturing carbon dioxide.

Forestry

Nebraska's forests experienced major losses during the drought and fires of 2012. More than half of the trees in the Pine Ridge have been lost to fires in recent years. When combined with losses from pests such as the pine beetle and the expected invasion of the emerald ash borer, Nebraska is facing the loss of millions of trees. Since trees provide numerous benefits including carbon sequestration, shading homes from the sun and wind breaks that reduce erosion, plans to mitigate these losses by planting new trees and supporting better forestry methods can provide multiple benefits.

Business and Industry

The 2014 report singled out the insurance industry, which has a major presence in Nebraska and must respond to claims from extreme weather events. While impacts to the insurance industry certainly deserve consideration, other business responses to climate change should also be considered. For example, businesses may invest in efficiency or renewable energy measures to reduce their utility bills while simultaneously reducing their carbon footprint. Many businesses choose to invest in renewable energy or otherwise improve their environmental impact as part of a branding strategy. Markets for sophisticated energy and water monitoring systems are just beginning to develop and represent major opportunities that could be developed in Nebraska. Electric vehicles and associated infrastructure could provide major economic benefits. On the negative side, extreme events and shortages can hurt businesses. Increasing energy costs hurt both consumers and businesses.

Future Technologies

There is a great deal of existing technology that can be used to reduce greenhouse gas emissions, ranging from renewable energy and energy efficiency to no-till crop methods. However, it is also important to consider the potential of new technologies.

There are a wide variety of energy technologies that hold promise. Mass storage improvements, including battery storage, have the potential to be a game-changer for

renewable energy generation. At the present time battery storage is more expensive than generation technologies that are currently in use. However, battery storage costs continue to decline while effectiveness and efficiency show significant increases.

Nuclear power is often mentioned as a fuel source that can generate electricity constantly with little or no carbon emissions. However, issues of cost, security and lack of storage for radioactive material are causing utilities to shut down nuclear power plants and preventing the development of new plants. The closing of the Fort Calhoun nuclear station by the Omaha Public Power District in 2016 because of cost issues is a local example of that phenomenon. New nuclear technologies, often referred to as fourth and fifth generation nuclear, are supposed to be more efficient, reduce the amount of waste material and provide much higher levels of safety and security than the aging nuclear power plants currently in operation. Thorium reactors have been suggested as a new nuclear energy source but have seen little development at this time. There have been numerous investigations into creating viable nuclear fusion processes, but none have been created to date.

Hydrogen as a fuel source is another intriguing possibility. One unit of NPPD's Sheldon Station, located in Lancaster County is being converted to hydrogen power, which creates no carbon dioxide in the process of generation process. However, that process is linked to the creation of carbon black from methane and may not have wider application. The conversion has just begun and it is too early to draw conclusions about its success or failure.

Information technology also has great potential for expansion in response to the impacts of climate change. More information combined with better controls can lead to greater efficiency of heating and cooling systems. A smart grid can dispatch energy more efficiently and respond better to the needs of consumers. Farmers and ranchers can make better decisions about the timing and amount of water and fertilizer to apply with better information resources. Nebraska should take advantage of its role as an agricultural state and the research and technology resources of the University to support the development of agricultural technology companies.

Conclusion

It is time for the State of Nebraska to create a climate action plan. The plan should be based on empirical evidence and Nebraska-based data, making use of Nebraska expertise and developed through outreach to the public and coordination of public and private sector interests.