

Testimony to the House Select Committee on the Climate Crisis
David Foster, Distinguished Associate, Energy Futures Initiative
April 30, 2019

Good morning, Madame Chairwoman Castor and Ranking Member Graves. I'm pleased to be here today on behalf of the Energy Futures Initiative to speak to the important issue of the energy and energy efficiency workforce in our country during a time of considerable technological change and policy debate, both of which can have consequential effects on the lives of the men and women who work throughout our energy economy.

Twelve years ago, in 2007, I testified to the Select Committee on Energy Independence and Global Warming. At that time I reflected, "One of the most famous American industrialists of the 20th Century, Henry J. Kaiser, who built an innovative manufacturing enterprise that included aluminum, steel, and ship building and created the health care delivery system that still bears his name, once observed that "Problems are just opportunities in work clothes."

Twelve years later, I'm pleased to report that a lot of Americans have put on their work clothes and got about the business of solving climate change. Today, of the 6.7 million Americans who work in the energy and energy efficiency industries over 3.5 million, more than 50%, are contributing to a lower emissions economy. 350,000 of them do this in the wind and solar energy industries, another 63,000 thousand in nuclear power plants, 65,000 in hydro and 70,000 in low emissions advanced natural gas generating plants, and thousands of others in geothermal, combined heat and power, battery storage, and many other technologies, including several hundred at the first coal-fired power plant retrofitted with carbon capture technology at the Petra Nova generating station, just south of Houston, TX. If it is done right, with the interests of America's middle class and working families, at heart, there will be a place at the table, a job and a pay check for every American while we solve the climate crisis. But we have to do it right.

Most of the Americans whose jobs are reducing greenhouse gas emissions today are working with energy efficiency technologies. In fact, almost 2.35 million people work in energy efficiency in the United States, retrofitting our buildings, installing LED lighting systems, and manufacturing high efficiency HVAC systems and hundreds of other EnergyStar certified products. They provide the design and engineering plans to restructure our built environment. They reduce the energy consumption in our energy intensive industries and in every way they are changing the way we interact with our environment.

In transportation, almost 254,000 Americans now work manufacturing and designing alternative fuels' vehicles including all electrics, hybrids, and plug in hybrids, while another 486,000 work in the motor vehicles' component parts industry, specifically on those products that make our automotive fuel consumption more efficient. This is how we solve climate change—by doing the hard work every day and getting a pay check from construction work, factory jobs, from mining the critical minerals like copper, iron ore, and bauxite, and designing, financing, and permitting the systems and products that create our low carbon economy.

For 31 years I worked with the United Steelworkers union, the last 16 as the Director of the 13-state District #11, based in Minnesota. In 2006 with the Steelworkers support, I was the founding executive

Director of the Blue Green Alliance, a national organization that unified 10 labor unions and five environmental organizations with over 14 million members around a vision of a fair and just transition to a low carbon economy that would put money in working families' pockets and make America the leader in low carbon technologies. I also served for three years as Senior Advisor on energy, economic development, climate, and workforce issues to US DOE Secretary Moniz from 2014-2017. I currently serve as a Distinguished Associate at the Energy Futures Initiative, an energy policy think tank, founded by the former Secretary and a consultant to the Roosevelt Project at the Massachusetts Institute of Technology. I also serve on the boards of two manufacturing companies, Kaiser Aluminum and Evraz, NA, a steel company.

While I was at the U.S. Department of Energy (DOE), I was responsible for overseeing the design and production of the U.S. Energy and Employment Report, an employer survey-driven study of how new energy technologies were affecting labor markets in the U.S. in five critical sectors—Fuels; Electric Power Generation; Transmission, Distribution and Storage; Energy Efficiency; and Motor Vehicles. We focused on these sectors because they were at the core of the system through which we create, distribute, and consume most of the energy in the American economy. After producing two editions of the U.S. Energy and Employment Report, I have continued this work at the Energy Futures Initiative in partnership with the National Association of State Energy Officials (NASEO). This partnership has produced two subsequent reports on the energy workforce, using the identical methodology we created at DOE, released in the spring of 2018 and most recently, the spring of 2019.

Energy jobs data is critical to measuring the economic success of any climate change mitigation program, pinpointing any adverse economic consequences, and crafting solutions for working people and communities that may be upended by changing energy technologies.

Here are some of the key findings of our reports:

Although the energy sector in the U.S. has steadily declined as a percentage of U.S. Gross Domestic Product (GDP) since the Oil Embargo of the 1970's, with one notable exception during the 2006-08 period, energy occupies a unique position in the American economy. It is the sector upon which every other sector is dependent.

Today's energy and energy efficiency sectors employ 6.7 million Americans, with 35% of those employees focused on energy efficiency, 19% engaged in transmission, distribution and storage of fuels and electricity, 17% producing fuels, another 13% producing electricity, and 15% working in gas stations.

For the last four years, the energy and energy efficiency sectors have out-produced the rest of the American economy, creating jobs at a more rapid rate than the economy as a whole. In 2018, the US economy increased jobs by 1.8%, while the energy and energy efficiency sectors added jobs at 2.3%, creating 7% of all new jobs.

It is critical to understand that an economy whose energy sector is constantly becoming more productive, more efficient and more cost competitive not only creates jobs itself, but also stimulates job creation in every other sector of the economy including in manufacturing, construction, agriculture, health care, or IT services. Energy is a critical cost component that links systems, enables innovation, and stokes global competitiveness. We need only look to neighboring economies where the cost of

energy, inefficient energy systems, and unreliable delivery infrastructure disrupt and slow economic activity.

Our energy system starts with the production of fuels which today employ 1.13 million Americans, an increase of 52,000 in 2018. Most of this increase was a result of the resurgence of oil and gas production in the U.S. While some advocates for aggressive action on climate change may see the growth of domestic oil and gas production as a threat, I see it as an opportunity that affords us the economic stability to plan the transition to a low carbon economy over the next thirty years without the disruption that spikes in fossil fuel prices or lack of availability would cause. Just remember the problems that accompanied the 2007-8 spike in oil prices to \$140/barrel. Agriculture, manufacturing, and transportation, worldwide, faced serious consequences.

The luxury of our current energy abundance also allows us to attack the much more difficult problems of reducing GHG emissions from the industrial, agricultural, and transportation sectors without dealing immediately with the social dislocation that would be caused in those sectors and in more rural parts of the country, all of which are more heavily dependent on fossil fuels.

Although most fuels' production in the U.S. is fossil today, it is important to note that the 2019 USEER identified over 106,000 Americans who work in renewable fuels, an increase of almost 2300 jobs.

Electric Power Generation (EPG) employed 876,000 people in the US in 2018, a decline of some 8,000 from 2017, but roughly 8,000 more than in 2016. The declines were clustered in the solar, coal and nuclear generating technologies and were partially offset by gains in natural gas, wind, CHP, and geothermal. While the number of overall jobs in EPG has remained relatively stable, the fuel source of those jobs has changed dramatically and resulted in significant reductions in GHG over the last decade. Today, 640,000 people, or roughly 73% of the EPG workforce are employed in low emissions technologies—including wind, solar, geothermal, nuclear, hydro, combined heat and power, biomass, and low emissions natural gas. In addition to including almost $\frac{3}{4}$ of the workforce, these technologies produce almost 60 % of our country's electricity. 242,000 work in the solar industry, 111,000 in wind, and 63,000 in nuclear generation and 66,000 in hydro, our four principal zero emissions' technologies. This is the clearest proof I know that the transition to a low carbon economy can be done in a way that produces jobs, ensures reliability, and provides affordable electricity to consumers and business.

However, it would be misleading not to point out that this success is dependent upon the continued production of natural gas, the largest single source of generation in the country today and the employer of over 270,000 Americans on the extraction side alone. Another 352,000 work in the distribution and generation side of natural gas, for a total of almost 625,000. The shift of generation fuels from coal to natural gas has been one of the most consequential steps to reduce GHG emissions in both the electrical and industrial sectors over the last decade. The flexibility of natural gas has also been an important factor in accelerating the deployment of variable renewable energy technologies like wind and solar.

Our energy infrastructure workforce—the men and women who build and maintain the fuels' and electricity transmission, distribution and storage systems—is the scaffolding around which the rest of our economy is built. Without the “on time” delivery of reliable and affordable energy every other aspect of our economy would grind to a halt. Today, in addition to a million people employed in gas stations, our energy infrastructure workforce is composed of another 1.4 million Americans who build and service 642,000 miles of high voltage transmission lines, 2.6 million miles of interstate pipelines, and

6.3 million miles of distribution lines, as well as the ports, railway lines, and other essential infrastructure assets. According to the American Society of Civil Engineers, our country's energy infrastructure would get a D+ if given a high school grade. This translates into a \$177 billion funding gap over a 10 year period for the electricity system alone. We lose a significant portion of generated electricity to the inefficiency of our grid. Upgrades in the grid are another example of how efficiency investments can directly lead to GHG reductions by simply reducing the need for generation, regardless of source.

Finally, our energy efficiency workforce is critical to the success of any effort to address climate change, and its workforce challenges are key to the successful management of an overall energy workforce in transition. With 2.35 million workers, our energy efficiency workforce is composed of 55% construction workers, 21% professional and business services, 14% or over 320,000 manufacturing employees, 10% in wholesale trade and other. Our energy efficiency workforce has added over 275,000 jobs in the last three years and is the fastest growing sector of the low carbon economy.

Unlike fuel production and some renewable resources which tend to be geographically specific, our energy efficiency workforce is located in every state in our country. In my home state of Minnesota, there are EE workers in every one of our 87 counties.

It is especially important to note that we are facing a hiring crisis in energy efficiency technologies in our country that is the worst in the entire energy sector. According to our recent survey, 84% of employers in the construction side of EE found it either very difficult or somewhat difficult to hire new employees in 2018. This represented a 5-percentage point jump in intensity over 2017 with 52% of EE construction employers saying it was "very difficult" to hire new employees, citing a lack of experience, training and technical skills as the main reasons. EE employers had predicted 9% job growth for 2018 and yet were only able to grow by 3% last year. The skills' shortage has become critical and addressing it is key to creating a low carbon economy that benefits all working people in America and rapidly reduces GHG emissions.

I want to turn now to one of the key disparities in today's energy economy and one of the great challenges to the successful transition to a low carbon economy. That is the geographic uniqueness of key energy resources. Coal is concentrated in Appalachia, Wyoming, Montana, and the lower Ohio River basin. Petroleum resources are strongest in TX, LA, ND, and OK. Natural gas jobs are clustered in the Gulf Coast and the Marcellus Shale. Solar resources are strongest in the Southwest. Wind is concentrated in the Central Plains corridor. What benefits the deployment of one resource may negatively impact another.

So what are some of the effective job strategies for dealing with the disparities that are inevitable in the transition to a low carbon economy, to minimize dislocation, and maximize opportunity? Here are five key strategies.

First, we need to embrace an "all-of-the-above", flexible strategy toward climate solutions. There is no silver bullet, no single technology, nor one perfect policy that can guide our economy to a low carbon endpoint, guaranteeing CO2 reductions and a decent job for every American. But we can invest in a range of technologies and options to preserve flexibility and participation by every form of energy and every community during the next decade while we pursue every technological solution--from

renewables and battery storage in California to carbon, capture, utilization, and sequestration in Appalachia to small modular reactors in Idaho.

This is the scientifically prudent approach and it is also the economically inclusive approach. It is especially important when we think about how to decarbonize the industrial, agricultural and transportation sectors of the economy which are responsible for almost 70% of total emissions. It also means that our coal and gas dependent communities have jobs and a path forward. It means our rural, industrial communities have a role to play. That agriculture is an ally. It means our coastal communities can look to offshore wind, and our renewables-rich communities can prosper. The low carbon economy doesn't need winners and losers. It needs collaborators.

Second, we need to accelerate our investments in energy efficiency with a special priority on those regions of the country negatively impacted by declining use of fossil fuels. Numerous local clean energy development funds have demonstrated the effectiveness of energy efficiency financing mechanisms as a vehicle to pay for building retrofits through energy cost savings while also creating well-paying construction jobs. Such agencies as the New York State Energy Research and Development Authority, the St. Paul, Minnesota Trillion BTU initiative, the many utility administered programs, PACE and on bill financing mechanisms have all demonstrated this success.

A third strategy is to invest in energy infrastructure. Energy infrastructure is necessary to and crisscrosses every community. It is also closely linked to energy efficiency GHG reductions on the electrical side and to methane emission reductions on the natural gas side. In addition to enhancing resilience and national security, these investments provide access to some of the best jobs in America and provide pathways to lifelong skills and job security. Inevitably, such infrastructure investments lead to broader economic development.

As a former DOE employee and board member of DOE's Loan Program Office, I would be remiss in not stressing the immediate and important role that the DOE Loan Program Office could play in jumpstarting investments in our country's energy infrastructure and creating thousands of well-paying construction jobs and learning opportunities. With \$39 billion of unused low interest loan and loan guarantee authority, the LPO could move rapidly into the much needed space of helping to finance America's next generation of energy infrastructure. The Energy Futures Initiative has provided an analysis of this subject, published in March, 2018, entitled, "Leveraging the DOE Loan Program: Using \$39 Billion in Existing Authority to Help Modernize the Nation's Energy Infrastructure" which is attached to my testimony. The LPO could also play a role in supporting the use of regional clean energy lending institutions, accelerating the deployment of energy efficiency technologies.

Both energy efficiency and energy infrastructure investments are applicable for every community in the country. However, by investing, first, in these critical aspects of the energy system in those communities and regions impacted most significantly by the loss of jobs in fossil fuels, we can provide economic development support where it is needed most, a critical choice at a time when new energy technologies are displacing some long-standing energy production systems. The sequencing and timing of how we solve a problem can ultimately determine the support it achieves from our fellow Americans.

Fourth, we need to focus on the manufacturing supply chains that our new energy technologies are creating. Nothing is more frustrating than looking back over the years of American technological innovation and recording the history of American applied research being handed off to other countries

for commercialization. Such was the story of wind and solar technologies, developed here in the US, before being ceded to Europe and Asia. We do not need to repeat this history with the next generation of low carbon technologies.

Especially with energy efficiency products, such as high efficiency appliances, lighting systems, industrial motors, or water pumps, one of our clear goals, when introducing new regulatory requirements, should be assuring a manufacturing policy that encourages “Made in America.” Much of the infrastructure is already in place but we need to nurture it and aggressively support it. The EnergyStar brand, promoted by the US EPA is one of the strongest product marketing brands in the world, recognized as the gold standard for efficiency. Using a new EnergyStar Made in America procurement policy to support the manufacture of “best in class” products in the global economy would be one of the best paths forward to a resurgence in American manufacturing.

EnergyStar not only certifies products, it also certifies commercial buildings, single family residences, and industrial processes. We already have the least carbon intensive steel industry in the world, for instance, and that should be a cause for celebration and recognition. Carbon performance should be a universal procurement standard for government spending in the US, similar to what California recently did with its “Buy Clean” standard. Such a policy would provide a significant boost for domestic manufacturing.

Finally, we need to address the workforce development crisis across all energy technologies, but particularly in energy efficiency. During the four years of the production of the US Energy and Employment Report, I have watched with alarm as the reports of employer hiring difficulty have steadily gone upward from 75% in 2015 to 80% in 2016 to 83% in 2017 and finally to 84% last year. At the same time the disparity between projected hiring growth rates and actual hiring rates from employers in key industrial sectors has grown wider and wider.

Consider these examples. In 2016 EE construction firms projected a growth rate in 2017 of 11%, but actual employment in those construction firms declined by 7% that year. Overall, energy efficiency employment still grew by 67,000. Two years later hiring difficulty by these same construction firms had risen to 84% with 52% saying it was very difficult to hire new employees. Employers had projected hiring 10.6% or over 120,000 jobs but the reality of hiring difficulty got in the way and they added only 21,000 jobs. This was a failure of our workforce development system with very real world consequences. From the environmental perspective, millions of tons of CO₂ went into the atmosphere that could have been prevented. But from the human perspective, this represented over 100,000 families that could have entered the middle class with some of the best paying jobs in America.

I want to finish my testimony with some comments about our energy system and job quality in America. We have recently heard much more discussion about income and wealth inequality in America, often from surprising sources. At EFI we recently completed a wage survey of energy sector employment to better understand the effect that technology shifts were having on job quality, access and inclusion in our energy workforce. We expect to publish a full report on this subject later in the spring.

Let me share some preliminary findings with you today. First, with a handful of technology exceptions, our energy and energy efficiency workforce is racially as diverse or more diverse than the American workforce as a whole. Thus, in Fuels, Electric Power Generation, TDS, and EE these sectors of the economy are places where all Americans can feel welcome. In Electric Power Generation and in

Transmission, Distribution, and Storage, the workforce is 35% more diverse. Gender equity, however, does remain an issue. Energy and energy efficiency jobs also pay substantially more than equivalent occupations outside of the energy field. For instance, an electrician working in the electric power generation area gets paid, on average, \$1.49 per hour more than an electrician generally, a construction laborer in EPG gets \$.95 more. In TDS those premiums rise to \$2.66 and \$1.70. Interestingly, across a range of manufacturing positions, Energy Efficiency workers earn from \$.82-\$1.39 an hour more.

Another important factor underlying this wage differential is the higher degree of unionization in America's energy sector. In Transmission, Distribution, and Storage, the unionization rate is almost three times higher than the average private sector rate. In Energy Efficiency it's double, while in Electric Power Generation it is generally higher except in the wind and solar technologies. Fuels production is below the average.

The quality of energy jobs is very often the anchor to the social and economic quality of a community. Consider for instance the relatively rural, isolated nature of most of the communities where America's 90+ nuclear generating stations are located, producing 20% of US electricity, all of it carbon free. The nuclear sector happens to have the highest median wage of any technology in the energy sector. It is not surprising that these employers and their employees are among the most highly valued in any community. Regardless of your personal views on the value of nuclear to our overall energy system, it should be our aspiration that every job in energy in America has the same value to its community that those nuclear jobs do.

I want to close by thanking the Committee again for this opportunity to testify about the importance of America's energy workforce and our collective responsibility to those men and women to ensure their safety and economic security since the rest of our economy depends on them. As I said earlier, the problem of climate change is an opportunity in work clothes. That means it's a paycheck not a layoff slip. With sound economic analysis, accurate jobs data, and a collaborative approach we can manage our path to a low carbon economy by investing in new opportunities and new jobs first before we put old technologies on the shelf.

Thank you very much.