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Committee on Commerce, Science, and Transportation
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Chairman Rockefeller, Ranking Member Thune, and Members of the Committee:

Thank you for inviting me to testify at this hearing on the role of manufacturing hubs in a 21st Century innovation economy.

Siemens is one of the world's largest technology companies. We operate in the energy, healthcare, infrastructure, and manufacturing sectors. For more than 165 years, we have built a reputation for leading-edge innovation and the quality of our products, services, and solutions. I like to say that Siemens is the oldest, biggest company in the world. There are a few that are older, but not as large. There are a few that are bigger, but they do not have a history dating back to 1847. We became the oldest, biggest company in the world because we stayed true to the vision of our founder, Werner von Siemens. As both an inventor and an innovator, he knew how to make things useful and commercially successful. He recognized early on that our success would be determined by our ability to anticipate and engineer the future.

As CEO of Siemens USA, I am proud to serve on the Business Roundtable's Education and Workforce Committee and the steering committee of the Advanced Manufacturing Partnership 2.0, which is a working group of the President's Council of Advisors on Science and Technology. U.S. manufacturing is growing again and becoming more competitive. There is a lot of investment in existing and new manufacturing plants due to low energy prices – driven by the development of shale gas – as well as rising labor rates in emerging countries, and increased productivity in the U.S. This means that more companies are bringing manufacturing facilities back to the U.S. We have already seen over $90 billion in new manufacturing investments being planned, especially in energy-intensive industries like chemicals, steel, and aluminum.

Siemens itself, which has been doing business in America since 1854, has invested more than $25 billion in the U.S. in just the last 12 years. We have over 130 manufacturing sites here, export about $6 billion worth of products each year, and are proud to be part of the local fabric of communities in every one of the 50 states, the District of Columbia, and Puerto Rico, employing nearly 60,000 people in the U.S. Today, the U.S. is not only by far our largest national market, but also an extremely vital production location, one of our most important research centers, and a key base from which we export to the rest of the world.

As a global company, when we are looking for a new place to manufacture a product, we take five main considerations into account: First, we want to be close to our customers in the leading markets. Second, many of the positions in our company require highly skilled workers,

so we look for areas with a commitment to workforce development and higher education. Third, we want to be close to world-class R&D that we can link to our innovation engine and our supply chain at our manufacturing sites, particularly for early-stage technologies. Fourth, we look for strong infrastructure to get our goods and services to our customers. Fifth, we look for government policies that encourage investment, like the Production Tax Credit, the research and experimentation tax deduction and credit, and the manufacturing innovation institutes being proposed in the Revitalize American Manufacturing and Innovation Act.

For many years, conventional wisdom said that because labor was cheaper elsewhere, manufacturing in America was more-or-less doomed. But that conclusion assumed two things that have turned out to be wrong: first, that cheaper wages would always translate to lower production costs; and second, that the products of the future would essentially be commodities, the kind that could be built of equal quality, with equal technology, anywhere in the world.

Those assumptions were right when it came to making things like textiles and furniture — relatively low-technology products that require relatively little innovation on the front end and relatively minimal precision on the back end. But the assumptions were largely wrong when it comes to high-end products, which require highly skilled workers, high-precision assembly, intensive research, and complex technology.

If you are in the business of building high-technology products – the kind of products that will eventually emerge from the work done in these innovation institutes – then the wages you pay are usually a less significant line-item on your income statement. That makes it possible to build them in America, as cost-competitively as anywhere else, because access to innovators is far more important than access to cheap labor. But here is the catch. If we cannot improve the products we build here, through each new generation, we will not succeed. Constant innovation is the only way to stay ahead of competitors. That means that success in American manufacturing will require us to build technologies and processes that we can constantly improve to stay ahead of our competitors.

That is both the opportunity and the goal of these proposed manufacturing hubs: to take an American invention and innovate it to make it useful, scale-able, and commercially viable. Siemens is in the process of donating $440 million worth of state-of-the-art software and training to the College of Science, Technology, Engineering, and Mathematics at Youngstown State University. The university will use our gift to support the America Makes manufacturing innovation hub in Youngstown, Ohio, which is devoted to incorporating 3-D printing into mainstream American manufacturing. While 3-D printing has been around for decades, the optimization of 3-D printing in the manufacturing process will drive innovation, lower costs in design, and improve overall efficiency and quality in the manufacturing industry.

That is the kind of competitive advantage that innovation institutes can start bringing to American manufacturing. With each institute focusing on a particular aspect of advanced manufacturing, we can accelerate the commercialization of innovations in the U.S. – which

would defy recent decades of conventional wisdom about U.S. manufacturing.

One of the reasons Germany is currently a world leader in the use of robotics in manufacturing and in high-end industrial engineering is that the country has long had dozens of hubs, called Fraunhofer Institutes, each of which brings businesses, university departments, and targeted government funding together to tackle the challenges of commercializing a particular aspect of advanced technology that has the potential to strengthen that nation's manufacturing strength.

The manufacturing strength in the U.S. is being driven by software – helping companies increase flexibility and productivity, while shortening time to market for goods

The software Siemens is donating to Youngstown State University is called Product Lifecycle Management, or PLM. Siemens PLM is an American success story. The original software was developed in the U.S., by a U.S. company that became part of the Siemens family in 2007. PLM software can bring the real and virtual worlds together in a way that collapses the boundaries between the two. Recently, our PLM software was used to digitally design, test, and assemble NASA's Mars Rover Curiosity and Elon Musk's SpaceX. This is the same system that Chrysler uses to make cars, Dyson uses to make its vacuum cleaners, and Calloway uses to make golf clubs. This bridging of the real and virtual worlds continues to drive innovation and stimulate the resurgence of manufacturing in America.

The U.S., as the world's leader in software development, has a leg up in the global manufacturing race, but we need a skilled workforce for advanced manufacturing, which is dramatically different from traditional manufacturing. Images of men in overalls carrying their lunch buckets to a factory, hot warehouses, dirty work, and assembly line production have been relegated to the movies. The reality is, today's manufacturing economy is the most sophisticated, forward-looking, and innovative business function in the world today. Customized production has largely replaced mass-production assembly lines, advanced robotics are increasingly doing the dirty, dangerous works of manufacturing, and sophisticated software systems now run huge industrial machinery. Today's factory workers have strong technical and analytical skills, and are just as likely to carry a tablet computer as a wrench. But there is a significant gap in the skills needed for these advanced manufacturing environments and the education and training that today's students and workers receive.

Siemens' donation in support of the America Makes institute in Youngstown includes training in the use of PLM software, and the institute's work includes a large workforce-training element. The software will be used to educate students and prepare them for careers in fields ranging from robotics design to computer-aided engineering to additive manufacturing in a multitude of industries around the world, including aerospace, automotive, defense, energy, high-tech electronics, machinery, and oil and gas. The hub will help prepare a modern workforce in the Cleveland-Pittsburgh TechBelt and throughout the U.S. The America Makes institute is just a short distance from the YSU campus and the school is now attracting students from across the country seeking advanced manufacturing, materials, and engineering degrees.

It is this type of training and partnership that we need to enable more Americans to excel in high-tech manufacturing environments. My participation in the new Advanced Manufacturing Partnership 2.0 is focused on closing this training gap. These new manufacturing innovation institutes can and should incorporate into their work the development of workforce training programs, just as the Fraunhofer Institutes in Germany have a consistent training element to ensure a workforce for their innovations.

This is how we can make manufacturing work in America. But I do not want to paint too rosy a picture. The truth is that innovation is not happening only here. The major advances being made right now in wind and solar technology are being made in Europe. Major advances in bio-fuels are happening in Brazil. The same can be said for batteries in Asia. If we keep taking a back seat on innovation in such critical new industries, there will be a point where we are no longer the leader in innovation. Without a relentless dedication to innovation, the U.S. will be outmatched on the global stage, without recourse.

To prevent that from happening, we must all work together to make the right kind of investments, right now. The Brown-Blunt Revitalize American Manufacturing and Innovation Act and the resulting innovation institutes form an important part of U.S. manufacturing maintaining its edge.

If we get this right, the story of the next decade will not be another one about the decline of manufacturing. It will be about how American manufacturing, once again, saved America's middle class.

I applaud Senators Brown and Blunt for introducing the Revitalize American Manufacturing and Innovation Act. I thank Chairman Rockefeller and Ranking Member Thune for holding this hearing and for inviting me to testify.