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And Land Grant Colleges

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Industries of the Future:

Opportunities for Land-Grant Universities

Prepared Remarks of

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New Opportunities for Academic Partnerships with the U.S. Department of Energy

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1. IOF focus industries and crosscutting technologies

Thank you for inviting me to be on this panel. I am proud of the statewide coalitions West Virginia University is spearheading through the Industries of the Future (IOF) program, and am happy to have the opportunity to share our experience with you. Denise Swink and her team in the Office of Industrial Technologies have been our partners in this effort, and we very much appreciate their cooperation and support.

In recent years, the Office of Industrial Technologies has taken on a challenging task -- attempting to move America's energy-intensive industry sectors to more efficient use of energy and improved environmental performance. Its goal is to make core manufacturing and production as energy-efficient and as resource-conscious as possible.

Bedrock industries such as aluminum, steel, glass, chemicals, pulp and paper, metal casting, petroleum refining, agriculture, and mining are the *core focus industries* of the IOF program. According to Energy Information Agency studies, these sectors account for approximately three-fourths of all U.S.

industrial energy consumption. Energy savings and technological advancements in these industries can help reduce the U.S. trade deficit, improve our environment, retain U.S. manufacturing jobs and reduce exposure to fluctuations in world energy prices.

The Office of Industrial Technologies has also identified several *crosscutting technologies* such as combined heat and power (i.e. cogeneration), sensors and controls, and advanced industrial materials that have broad applicability to the nine focus industries. The IOF program facilitates cost-shared, collaborative projects, involving both focus industries and crosscutting technologies, to address the national goals of improved energy efficiency and resource sustainability. The industries benefit from improved productivity, reduced operating and waste disposal costs, and increased global competitiveness.

2. Brief background on IOF-WV

In February 1997, Denise Swink and Charlie Sorrell were in West Virginia to visit some of our carbon products companies that had been working to incorporate carbon products into the IOF program as a crosscutting technology. During that visit, we discussed the prominence of IOF industry sectors in West Virginia. (Over half of our manufacturing jobs and three-fourths of our manufacturing GSP are in IOF companies!) Denise suggested a state-level IOF program, and the idea really seemed to click with everyone.

There is a real sense of urgency in West Virginia about retaining our IOF companies over the coming decades. They are facing unprecedented technological changes, environmental regulations, and international competition. Therefore, at WVU, we have been highly motivated to spearhead a state IOF program in cooperation with our companies, our state development office, and the national IOF program. West Virginia, by the way, is recognized as the first state to do so.

Our initial step was to convene *working groups* for six of the most prominent IOF industry sectors in the state - aluminum, steel, glass, chemicals/polymers, wood products and metal casting. These working groups consisted of plant managers, company executives, WVU faculty members, and representatives from our West Virginia Development Office. The purpose of these early meetings was, first of all, to inform state industry groups about long-term visions and technology roadmaps already developed in the national IOF program. Secondly, to let West Virginia industry leaders express their concerns for the future, and offer their views on R&D needs and priorities. Our industry groups have been highly responsive to these discussions.

In December 1997, WVU convened the first *state-level IOF symposium*, bringing together representatives of five IOF-WV industry sectors as well as several cross cutting industries. The meeting was held in Charleston, our state capital, and was keynoted by our Governor, Cecil Underwood. At that meeting, participants brainstormed to create lists of more than 120 fertile R&D topics.

In December 1998, WVU hosted the second annual IOF-WV Symposium on our campus in Morgantown, with both Senator Jay Rockefeller and Governor Underwood taking part. The focus at the second symposium was less on brainstorming new ideas and more on reporting progress and developing projects.

Partnerships and projects have continued to evolve between core industries, faculty research teams, private sector suppliers, and state and federal government agencies. As the R&D needs of our industries have become more focused and prioritized, the goals and expectations of the industry working groups have evolved toward proposal development and securing resources to conduct essential projects.

Our third annual IOF-WV symposium will be held on November 18 in Flatwoods, West Virginia. I cordially invite you to attend if you would like to see our program in action. One goal of the 1999 symposium will be to showcase several successful projects from the national IOF program that are relevant and useful to West Virginia companies.

3. Opportunities for land-grant universities

There are challenges and opportunities here as well for our nation's state and land grant universities - to use our applied research, teaching and service in partnership with state industries and the U.S. DOE to help achieve the national goals of energy efficiency and resource sustainability.

We believe an IOF program can be an opportunity for the type of engagement envisioned by the Kellogg Commission when it called for partnerships that are "... two-way streets, defined by mutual respect among the partners for what each brings to the table." We are being asked to attain new levels of responsiveness throughout every aspect of our teaching, research and service -- to move beyond conventional concepts of outreach and extension -- to achieve no less than what President Martin Jischke characterizes as "... a new conception of the connectedness of land-grant and state universities with the larger society."

The Kellogg Commission's call for more meaningful engagement could not have come at a more critical time. It is crucial that we at land grant universities arm ourselves and our constituents with an array of new technologies, and build partnerships with traditional industries that will help them bridge into the new millennium. For example, with NSF support, WVU has implemented a connection with the *Next Generation Internet*. And we are developing statewide supercomputer access through collaboration with the Federal Energy Technology Center in Morgantown and the Pittsburgh Supercomputer Center. We are also proud of the fact that 96% of public schools in West Virginia are wired to the Internet and that West Virginia is tied with Arizona for the 10th lowest student-to-computer ratio in the U.S.

4. Need for IOF-type partnerships

We see the IOF program as a catalyst for R&D partnerships that focus academic research groups and national labs on important technical issues confronting U.S. industry. These partnerships can help fill the void left by the decline in U.S. industrial R&D centers. Five years ago, Weirtech, the R&D arm of Weirton Steel, had over 70 researchers working to improve steel-making processes and develop new products. There are now six employees in Weirtech doing routine tests. Over the past 20 years, UCAR Carbon's worldwide R&D center in Parma, Ohio has gone from over 600 scientists to fewer than 100. And there are many other such examples of declining corporate investment in R&D - especially in the IOF industry sectors.

In addition to the decline in industrial R&D centers, there are many transitions now in progress - digitization, deregulation, globalization - that will have profound impacts on industry in the new millennium. Old industry sectors will transform into new ones, and some may die out. But they also get reinvented and revived. For example, a factory in West Virginia vacated by Corning Glass is now a modern production plant for Schott Scientific Glass - a wholly owned German company producing glassware primarily for the pharmaceutical industry.

At our 1998 IOF-WV symposium, Senator Rockefeller expressed both his excitement and concern for traditional industries as we move into the high-tech economy of the future. He challenged us to think about questions such as: After four or five generations, where will Silicon Valley lead us? What will be the societal impacts? How do our traditional industries take advantage of what the world is becoming?

Also at the 1998 symposium, Denise Swink encouraged traditional industries to use the IOF program to help change the image of the word "traditional." "Just because you may have been around for a long time doesn't mean you can't use the latest in information technologies and advanced materials," she said. "Be traditional, but also be on the forefront of technology for the world!"

In order to gain perspective on industry developments in the new millennium, management guru Peter Drucker looks at how technical revolutions of the past have evolved. In a recent article in *The Atlantic Monthly*, he observes that previous technical revolutions such as the printing revolution and the industrial revolution eventually changed the mindset of people. Initially, existing industries were "routinized" and streamlined by the new technologies. However, subsequent developments went far beyond the initial technology - beyond the printing press and the steam engine. The mindset of people changed - the realm of possibility greatly expanded - new visions were created and totally new, unexpected industries were started.

Engaged universities will be intimately involved with preparing workers for these new industries. Engaged universities will likely be the incubators of answers to Senator Rockefeller's questions and others, such as: How will the mindset of the next four or five generations evolve? How will traditional industries embrace new technologies? What new and unexpected industries will appear? (Drucker suggests biotechnology and fish farming as examples of new industries that are appearing in the wake of the information revolution!)

The beauty of IOF is that it challenges industry groups to look beyond the next quarter and even beyond the next decade. As you heard from Denise, it challenges whole industry sectors to create long-term visions of what they want their industries to be, and then to develop technology roadmaps for achieving those visions. A continuing challenge for IOF partnerships will be to make the very best in new technologies available to meet the changing needs of America's traditional industries.

5. Results of some IOF-WV projects

Results of our IOF-WV partnerships are starting to appear. Let me give you a quick overview of a few things that are happening with some of our groups.

- Century Aluminum has made a major commitment to the IOF program and is now involved, with others, on two multi-million dollar projects to improve the efficiency of aluminum production. Century is partnering with large companies such as Southwire Corporation and SGL Carbon Corporation as well as with WVU and two small West Virginia technology companies on these projects.
- Weirton Steel Company was recently awarded the first successful NICE³ project in West Virginia history. NICE³ is the OIT program called *National Industrial Competitiveness through Energy, Economics and Environment* - a program to cost-share implementation of promising new energy efficiency technologies. Two WVU professors have been instrumental in helping Weirton, Wheeling Nisshin, Wheeling Pitt, and other steel companies prepare proposals.
- Fenton Art Glass, WVU and the DOE's Federal Energy Technology Center are partners on a project to develop the use of CO₂ lasers to replace a wasteful step in the production of blown hand glass. The laser cutting technology will be implemented at a West Virginia glass company for production testing.
- An IOF-WV team is helping West Virginia's chemical/polymer industry develop projects to achieve the long-range goal of "zero discharge" - i.e., nothing to the landfill! Partners on these projects include companies such as Dupont, Rheox, the Polymer Alliance Zone of WV, Argonne National Lab and the WVU Chemical Engineering Department.
- Several million acres of hardwood forests is West Virginia's greatest renewable resource. A research team is currently investigating materials and heat transfer problems associated with the use of ultra-thin circular saw blades to reduce wood wastes in lumber processing. And we are working with the OIT and several wood/forest products industry associations to expand R&D opportunities for the hardwood industry in the IOF program.

6. Summary and closing comments

In closing, let me summarize by observing that:

- The IOF-WV program is enabling WVU research groups to engage in meaningful ways with industry to address the nation's energy efficiency and sustainability goals. Even though West Virginia is a low-cost producer of electricity (and that certainly helped attract some of our IOF industries in the first place), you can be sure they are now looking at ways to cut energy costs - especially with deregulation of the electricity industry coming.
- State IOF partnerships focus on state-level issues that create a sense of unity and purpose that may not be present on the national scale. It enables

state organizations and university research groups to team with federal agencies on projects to benefit the state. For example, the West Virginia Development Office is our key partner on the IOF-WV program. Competitive funding obtained by our Development Office through the OIT's State Energy Program has been essential to developing the partnerships and programs I am describing.

- IOF-WV partnerships are valuable not only for promoting efficient management and production in existing industries, but also for hopefully making our state more attractive to new downstream manufacturing businesses.
- When he became CEO of Owens Corning Corporation in 1992, Glen Hiner said his main job was to change how people think - to challenge inertia and tradition - to change the mindset of the corporation. Owens Corning created a vision, and partnering on projects was one of their principal means of achieving it - partnerships with a purpose. In some states, the mindset of traditional industries will evolve from mass production to niche production - from local, industrial economies to informational-based, non-geographic economies. IOF partnerships that include advanced technology and e-business companies along with the basic steel, glass or polymer companies can be a meaningful part of the transition.
- Based on our two and one-half years experience, we believe partnerships developed under a state IOF umbrella do have the potential to help achieve the mission of a land grant university and to help meet state economic development goals. NASULGC and the Kellogg Commission have set the stage for our engagement, the economic development needs of our individual states and unprecedented technology changes in our world compel us to act. If we don't do it, who will?

Thank you!