Briefing Submittals
U.S. Senate Committee on Energy and Natural Resources
For its consideration of Appropriations for S. 661
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Walter J. Foley
Vice President
American Iron and Steel Institute
Washington, D.C.

My name is Chip Foley and I am Vice President of the American Iron and Steel Institute (AISI). AISI represents 24 member companies in North America, and our members make 75% of the steel produced in the United States. Prior to the current economic downturn, the industry directly employed approximately 165,000 persons in the United States, supported a total of 1.2 million jobs overall, and contributed $350 billion to the economy annually.

The ability to develop and deploy new technology is the reason for our international competitiveness. I have listed some steel industry facts below and these are representative of the type of gains also made in other manufacturing sectors:

- The domestic steel industry is the lowest CO_2 emitter among world steelmaking nations as a result of billions of dollars of investment in process improvements;
- It is preferable, both economically and environmentally, to produce steel in the U.S.;
- The steel industry has reduced energy per ton of steel produced by 33% since 1990, and as a result of this achievement, our processes are pushing against their energy limits as defined by the laws of physics.

This last statement is particularly important and goes to the subject of today's briefing. First, let me tell you that many of the advances made since 1990 are a result of co-funded research with DOE. The second point, "our processes are pushing against their energy limits as defined by the laws of physics" is the key criterion that is driving our research today. Steelmakers, as well as operators in other manufacturing sectors, are now focused on the next technology breakthroughs—that is, to save any more energy in steelmaking, we have to fundamentally change the way we make steel—using completely new processes and different fuels.

In the steel industry, we call this research the CO_2 Breakthrough Program. We are developing processes that will make steel by emitting little or no CO_2. These processes are currently being researched at MIT and the University of Utah and use green electricity and hydrogen to replace carbon fuels. Another project with the McMaster University in Canada recycles steel plant waste and captures virgin iron units.

These projects struggled for collaborative funding at a time when the DOE program budget was very low, but due to their importance, are currently being funded entirely by industry. However, in 2010, when they leave the laboratory and are ready for small- and medium- scale industrial trials, the costs will jump into the hundreds of millions of dollars.

In Europe and Japan, steelmakers are also researching their "CO_2 Breakthrough Technologies." The EU Commission has just reached an agreement with EU steelmakers to jointly (50/50) spend €500 million on bringing their research to commercial reality. Similar programs in Japan and Korea, in the equivalent range of $100 million over five years, are ongoing.

This type of high-risk, high-reward research is necessary to make an impact in the energy utilization and CO_2 footprint of our manufacturing sector. This type of research is appropriate for joint funding by government and industry, as the goals and objectives of both are served by a successful outcome. We ask

that DOE research program funding be focused on large scale “breakthrough technologies” and be provided at a level that supports such work. The steel industry is ready with its share.

Another point to consider regarding energy and technology policy is the impact of climate policy. All forms of energy will be higher priced in a carbon-constrained world, making the technologies that allow industry to use less (which currently do not exist) a priority when one considers that many of our trading partners may not be following the same aggressive climate policies as the U.S. Technology development is the predominant competitiveness issue in the manufacturing sector and policies that promote technology development also promote a more competitive manufacturing sector and a cleaner environment.

Richard W Boyd
President
Nova Precision Casting Corp.
Auburn, Pennsylvania

My name is Richard Boyd and I am President of the Nova Precision Casting Corporation. Nova Precision Casting is a small steel investment cast foundry located in Auburn, Pennsylvania. With a current employment of 18 individuals, including myself, we produce jobbing quantities of specialty steel, stainless steel, and nickel base castings utilizing the investment or lost wax process in sizes ranging from less than a pound to 100 pounds finished cast weight, and in typical quantities of 100 to 500 pieces. Although we are of a smaller size, we are just one metal caster of approximately 2,000 in the United States today. There are at least 20 metal casters within an hour’s drive of our location in Auburn, Pennsylvania, with an average of approximately 100 employees each. Eastern Pennsylvania has always had a concentration of metal casters dating to the revolutionary war. It has been said that George Washington did not spend two winters at Valley Forge because of the scenery, but rather to protect the foundry industry that was vital to his heavy armaments. This basic need for metal casters continues today.

I can say with confidence that as you go through your daily life that you are rarely farther than ten feet from a metal casting. Every day that you enter this building you pass a row of bollards which rings this building and many other buildings in Washington. The caps on those bollards around this building and many others on high profile targets were cast by Nova Precision Casting, utilizing state of the art metal casting technology.

There should be no misunderstanding that the metal casting industry of today is a shrunken one from as recently as the late 1980’s. Offshore competition has taken many of what can be characterized as commodity type castings to their facilities where, among other issues, lower cost resources and labor are available to them. This does not mean that the industry is ready to capitulate. American metal casters have retained a technological edge through implementation of new technologies and the metal casters of today are stronger for the competition. I do not make this statement because I have read it somewhere, but rather after direct observance of facilities in China. Approximately eight years ago Nova Precision Casting lost two major accounts to Chinese foundries. One these accounts represented parts that were sent to Germany, where I felt that we already had a manufacturing edge. By chance, the Chinese foundry which took this work was also looking for a United States representative to market their capabilities. They made direct contact with me on this issue. As a business decision I viewed this as an opportunity to gain detailed knowledge of marketing, pricing, and quality of a major competitor. Nova Precision Casting to this day remains their representative and I have gained the insight I originally sought. I have also visited their facility and had the opportunity to assess their capabilities and knowledge on a first had basis. Nova Precision Casting has changed its marketing as a result of this knowledge. Without this understanding, I am not sure I would be before you today. The edge the United States metal casters have is technical knowledge and the ability to use this knowledge on the shop floor. We will thrive because of this ability, but the technological edge must be maintained.

One of the most crucial technology areas is energy. I cannot underline the statement that metal casters are users of energy enough to drive this point home. Nova Precision Casting exceeds $100,000 annually in electric and natural gas costs. Industry figures I have seen puts the typical metal caster over $1,000,000

annually in energy costs. These energy costs represent a substantial percentage of end product cost. Energy is used to melt the metal, heat, treat, and fire ceramic shells and molds, melt wax, run air compressor systems for finishing operations, maintain in-plant environmental conditions, power emission control systems, and a host of other functions. The last word has not been written on any of these uses to justify saying that no additional research is necessary and improvements cannot be made. As individuals, metal casters peck at the issue of energy usage improvements. Collectively with trade organizations such as the Steel Founders Society of America and American Foundry Society and others, improvements and savings are identified. But with a reliance on our own funding of research, these improvements are slow to be realized. This is where a partnering of industry and government has helped, and will continue to help, leverage these research projects of energy saving and identify potentially new technologies. Nova Precision Casting must and will keep pecking at energy issues but we are also ready to partner with others for a stronger industry and a better world for our families. The appropriation of full funding authorized by S. 661, ''Restoring America's Manufacturing Leadership through Energy Efficiency Act of 2009''will signify your commitment to partner with us for that better world.

Frederic Quan
Corning Glass
Glass Manufacturing Industry Council
Bath, New York

Good afternoon! My name is Fred (Frederic) Quan and I represent the Glass Manufacturing Industry Council (GMIC), speaking for the glass industry.

Our industry manufactures over 20 billion tons of consumer products valued at over 29 billion dollars annually. Glass is a very unique material whose origins are veiled in antiquity, back to ancient Egypt. It is known for its transparency and chemical stability and is used in many, many applications. Compared with competing materials, it is 100% recyclable and environmentally friendly. The constituent materials are completely natural and benign. Approximately 120,000 Americans workers are employed in our industry.

The Glass industry can be divided into four segments:

Segments	Output	Segment Percentage
Container Glass	9.4 tons	47%
Flat Glass	5.3 tons	26%
Fiber Glass	3.8 tons	19%
Specialty Glass	1.7 tons	8%

Although the Specialty Glass segment is the smallest, its monetary value is the highest per pound. To produce this output, 253 trillion BTUs of energy are consumed annually, costing over $2.5 billion. The industry is very capital-intensive and is considered one of the basic infrastructure industries in the United States. This capital is necessary because of the high temperatures needed to melt glass and the large volumes of material processed.

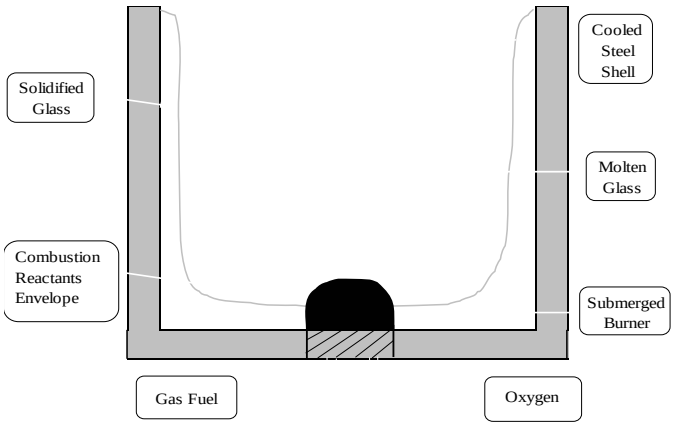
Major American glass producers are PPG Industries, Corning Incorporated, Automotive Components Holding LLC, Guardian Industries, Owen-Corning Fiberglass, O-I Inc., and Johns Manville. Unfortunately, most glass products are commodities with a correspondingly low profitability. The necessary capital to maintain and build new facilities has been increasingly hard to raise, even before the current economic downturn.

The glass industry was designated originally as an "Industry of the Future" by the DoE because of our energy-intensive manufacturing processes. The DoE Industrial Technologies Program (ITP) has been extremely helpful with our industry's "Grand Challenges" and has enabled competing commercial companies to work together.

An example of this collaboration is our Submerged Combustion Glass Melter (SCM) Project. This was a revolutionary way of making glass originally pioneered by the Soviet Union in their nuclear program. The glassmaking technology has the potential to reduce the cost of melting glass by a factor of 5-10 times. Energy reduction in the melting process could potentially be 15%. There is a substantial reduction in air pollution and this comes at a much lower capital investment.

The Submerged Combustion Glass Melter (SCM) was a radically different concept to melt glass. It uses a cooled steel tank rather than an expensive refractory container with the heat source under the molten glass rather than above the melt as in a conventional melter. This is shown in the diagram below.

Because the combustion occurs directly in contact with the melt, the heat transfer is very efficient. In addition, because the hottest flame is deep within the melt, the relatively cooler surface will not generate much nitrogen oxide compounds as pollutants.



As this concept is a high risk development project with immense impact, the DoE partnered with an industry consortium to carry out this research. This was in keeping with our research roadmap worked out earlier with DoE assistance.

This high risk, high impact project is a fine example of needed government assistance to help basic manufacturing industries. The cost and risk of this project put it beyond the means of any individual company. Indeed, it was beyond the means of the entire industry as the high technical risk made it a very large bet with our scarce R&D funds. When the DoE/ITP stepped in, it also made it possible for our normally competing companies to pool our resources without anti-trust problems.

From the DoE/ITP's standpoint, it enabled the government to develop a technology which was not only good for the glass industry but had other broader applications in other energy-intensive melting operations. These have been outlined numerous times by the Gas Technology Institute (GTI) so I will not further elaborate. With DoE/ITP involvement, the government will also gain a better understanding of how social goals such as air pollutants and energy can be mitigated and/or controlled.

The SCM technology can potentially revive the glass industry. Our industry, because of its many commodity products, has long suffered with low gross margins. With a cost reduction of this magnitude, the financial outlook for the glass industry will be much improved. This will keep plants open and people employed, and will help ensure American prosperity. This will also increase the use of recyclable glass by keeping prices down and help American industry remain competitive. By maximizing the efficiency of U.S. industry the DoE will help reduce carbon and energy usage.

In summary, the DoE/ITP participation on this project was critical. It has enabled an atmosphere of trust and collaboration within the industry and government to work for the common good. The basic premise of the DoE/ITP has been to let industry define its "Grand Challenges" and then help with solutions. This "buttons-up" approach is very positive and has produced a real and candid dialogue with the government. The glass industry has many other useful projects such as waste heat recovery, improved glass strength, and more effective glass batch formulations, which will have major impact upon our industry and society in general. We see the DoE/ITP program as a very useful and collaborative way to meet the major future challenges we all face, such as energy, carbon, and pollution reduction.

Thank you for your consideration.