



The American Chemistry Council Technology, Innovation and Government Reform December 2008

The business of American chemistry is science and technology based – a powerful engine of both the economy and innovation. The chemical industry is more than a supplier of products and solutions to other industrial sectors-- it serves as a power enabling enterprise for downstream customers of the wide variety of technological innovations it has created.

The prevalence of chemistry in everyday American life and the well-being of our economy are demonstrated by the role that patents play in chemistry-related innovation. One quarter of all patents granted in the United States are chemistry-related. Of these, half are granted for basic chemistry (roughly 6,500 patents per year), and half are granted to companies involved in downstream applications of chemistry, such as plastics, elastomers (rubber), microprocessors, solar cells, fiber optics and countless other uses.

In 2007, the chemical industry spent \$27 billion in organized industrial research, making the business of chemistry one of the largest in private sector funding of research and development. R&D spending in the industry is off from peak levels reached in the late 1990s due to adverse economic conditions, but nevertheless reflects a significant effort by the industry to make technological progress. Major areas of R&D interest and technological developments include:

- Biotechnology in chemical production
- Metallocene and other single-site catalysis
- Nanomaterials
- Direct oxidation of alkanes
- New inorganic chemistry
- Powder coatings, radiation cured coatings, and water based coatings.
- New solvent cleaning technological
- Molecular modeling and integration of artificial intelligence in R&D
- One-step processes to convert Carbon Dioxide into intermediates
- New construction applications (e.g., highly energy efficient insulation)
- Advanced composites
- Electro-optic and conductive polymers
- New polymers and fibers (e.g., corn-based polymers)
- “Smart” plastics and fibers
- Microelectronic chemicals and materials
- High performance chemicals (ceramics, metal matrices, etc.)

The percentage of revenue for basic and specialty chemical companies attributable to new products – a measure of innovation – was between 10-15% per year in the period 2002-2007. In the business of chemistry, innovation is the long term driver of future financial performance and value creation.

The American Chemistry Council believes investments in technologies and services that utilize the power of chemistry will produce long-term value of the American public and the economy, particularly vigorous innovation making the rest of the economy more energy efficient (e.g. building insulation and reflective coatings/coverings, light-weight vehicle parts) or that



makes and uses clean energy technologies (e.g. wind turbines, solar panels, lithium-ion batteries). ACC members have made a considerable investment in improving the energy efficiency of their own production operations (e.g., combined heat and power systems). Investing in clean energy/energy savings programs creates jobs, improves the nation's energy security, and reduces greenhouse gas emissions. Here are some of the many programs American Chemistry supports.

Promoting End-User Energy Efficiency

Low-Income Home Weatherization

US homes and commercial buildings consume more than 40 percent of our energy resources annually. Weatherizing a home is a more cost-effective strategy than providing home heating financial assistance, and weatherizing creates lasting improvements in energy savings and reduced greenhouse gas emissions. Reducing our demand for energy via low cost quick payback retrofits not only saves energy and money, but done on a large scale, generates large numbers of jobs, reduces energy consumption and lowers overall energy prices. *The Energy Conservation and Production Act, Section 422 and 42 U.S.C. 6872* appropriated \$700 million for FY 2008 for improving the energy efficiency of low-income homes. The Senate stimulus package included an additional \$200 million in FY 2008 for this program. Given President-elect Obama's campaign goal of weatherizing one-million homes a year, funding for this program should be considerably expanded. The Administration should consider expanding funding for energy efficiency research and development to accelerate bringing to market new technologies.

Energy Efficiency and Conservation Block Grants

Buildings and Transportation are the two largest sources of greenhouse gas emissions (~70 percent combined). A major commitment to funding energy efficiency programs in these areas is needed to achieve job creation, energy security and greenhouse gas emission reduction goals. *The Energy Independence and Security Act, Title V, Subtitle E and 42 U.S.C. 17012* authorized \$2 billion in each of FY 2008 through 2012 to help local governments initiate programs and strategies to improve energy efficiency in the transportation and building sectors. A recent economic study sponsored by the Center for American Progress estimates that a \$100 billion investment in clean energy and efficiency would result in 2 million new jobs, which suggests that \$2 billion in funding could create 40,000 jobs. Funding for this program has not been appropriated. This program should be fully funded, if not expanded to include additional research and development opportunities.

Industrial Energy Efficiency Investments

Investing in industrial infrastructure is another effective economic recovery strategy. Modernizing manufacturing plants and equipment creates jobs, makes the manufacturing economy more competitive in global markets, curbs energy consumption and reduces greenhouse gas emissions. Helping to spur large-scale and widespread technological development and investment in manufacturing plants and equipment are vital precursors to a lower-carbon economy.

Funding Assistance for Energy-Intensive Industrial Equipment



Businesses face frozen credit markets and have been forced to severely curtail capital investment budgets. The pressure on capital budgets is having a negative impact on investments in R&D. *The Energy Independence and Security Act (EISA), Title IV, Subtitle D* authorized \$410+ million for industrial energy efficiency research, development and deployment (RD&D) programs through the DOE Energy Efficiency and Renewable Energy office. This program should be expanded in size and scope and money should be made available to help finance the purchase of high-efficiency industrial equipment.

Boilers, furnaces, and motors are the largest sources of energy consumption and greenhouse gas emissions. The manufacturers who use this equipment are the largest energy consumers in the industrial economy and account for almost 10 percent of national greenhouse gas emissions. In many cases, purchasing new equipment or implementing the newest technologies can improve energy efficiency by up to 20 percent, making for a very considerable energy savings potential for this proposed program.

Funding for the Waste Energy Recovery Incentive Grant Program

The 110th Congress saw the value in creating a program to recover waste energy from industrial facilities and included such a program in the 2007 energy bill. Capturing and using waste energy at industrial facilities saves energy, increases energy security and reduces greenhouse gas emissions. It would also help make the industrial economy more competitive in global markets.

The Energy Independence and Security Act, Title IV, Section 373 authorized \$200 million for waste heat recovery through combined heat and power systems (CHP). The funding for this program has not been appropriated. Instead, this program should be funded and at higher levels than authorized by statute, including an effort to enhance technological innovations.

Accelerate Capital Cost Recovery for Energy Efficient Investments

A new report, “Combined Heat and Power: Effective Energy Solutions for a Sustainable Future,” recommends supplying 20 percent of the nation’s electricity from CHP by 2030 (in 2006, CHP accounted for more than 12 percent). A 20 percent CHP target would deliver fuel savings of 5.3 quads a year, equal to half of U.S. household energy consumption; \$234 billion in new investment and nearly 1 million new jobs for highly-skilled workers; CO2 emissions reductions of more than 800 MMT – equal to taking more than half of all passenger cars off the road; and will avoid more than 60 percent of projected increases in CO2 emissions.

Unfortunately, investment in CHP systems is discouraged in the U.S. by high capital costs and tax rates. One way to stimulate investment in new CHP systems is to put U.S. capital cost recovery rates for energy efficient investments on par with Canada’s. According to Ernst and Young, nominal capital costs recovered after five years of investment in U.S. CHP units stand at 29.5 percent. In Canada, capital costs recovered after five years equals 79.6 percent.

Accelerated depreciation for other energy-related equipment purchases should also be considered. Examples include high efficiency boilers, furnaces, motors and air compressor systems. The approach can provide a powerful incentive for investments that would bring new technologies to the market.



Energy Efficiency and Renewable Energy Incentives

The tax code is another effective tool for spurring investment in energy efficiency and renewable energy projects and programs, particularly in promoting new R&D in the chemical technologies that support alternative and renewable energy supplies. We believe the following proposals have high job creation potential, will curb energy consumption and improve energy security, and will result in less greenhouse gas emissions.

Renewable Energy Tax Extenders

The Financial Stabilization Package, H.R. 1424 (P.L. 110-343), included \$18 billion in renewable energy tax extenders. Congress can build on that accomplishment by extending the wind production tax credit (PTC) by at least 5 years, and make the PTC and its accelerated depreciation refundable. The PTC should be refundable for the duration of the credit for projects placed in service through 2015. This will create a longer-term, stable environment for large-scale U.S. wind infrastructure investment.

More generally, energy efficiency tax incentives and building codes provide an opportunity and motive for the public to achieve increased energy efficiency. Home and commercial building owners can be encouraged, required or incentivized to upgrade the insulation, systems, and controls on existing structures, and to choose energy saving materials in new construction. Investments in upgrades to the transmission grid will better connect consumers to renewable energy and is an area ripe for additional technological progress. Many believe this is the biggest obstacle to growth in renewable energy use. Upgrading the grid is essential to improving efficiency and connecting the remote wind corridor to cities that need the energy. This is stimulus because of the infrastructure technology demand and job creation impact.

Alternative Energy -- Industrial Incentive Program for Carbon Capture and Storage

Carbon Capture and Storage (CCS) is a critical technology that must be fully developed and commercially deployed in order to achieve reductions in greenhouse gas emissions while also increasing jobs in the U.S. Current market conditions are not adequate to incent or drive commercial investment in the technology and government funds to support private investment are limited.

A government-funded CCS grant program should make all industrial sources (i.e., power plants and manufacturing plants) eligible for participation. Eligible projects should not be limited in scope and should include retro-fits, modifications or new plants. The program should also be structured to maximize the job growth potential of the program by ensuring that any funded projects are geographically diverse. The current CCS program at DOE is too limited in size and scope.

In order to achieve CCS commercialization and robust job growth, a substantial increase in funding is needed. The Electric Power Research Institute (EPRI) estimates that \$17 billion is needed over the next 25 years in order to undertake the necessary RD&D that would avoid a \$1 trillion reduction in economic growth by 2050. The grant program should be funded at a level sufficient to provide each facility with a five-year payback schedule or less.



Vehicle Efficiency

Plastic and Composite Intensive Vehicles (PCIVs)

U.S. automakers must adapt their global vehicle architectures to provide consumers with choice and value when it comes to energy efficient vehicles. One way to drastically reduce vehicle energy consumption is to cut the weight of the vehicle. New developments in lightweight plastic and composite materials provide an innovative way to lighten vehicles while maintaining passenger safety and the integrity of the vehicle. The characteristics of plastic and composites – including strength to weight ratio, energy absorption and flexible design – make these materials ideal for use in automobile design. Congress should encourage the use of PCIVs in the manufacture of automobiles to lighten their weight and achieve higher fuel efficiency. Investing relatively modest amounts (e.g., \$25-50M) in further research in predictive computational engineering (which can accurately calculate how these advanced composite materials behave in collisions) would result in ongoing economic and environmental savings by supporting more widespread use of these materials in additional vehicle applications, resulting in even lighter, safer vehicles, and more energy efficient US personal transportation, .

Advancing Electric Vehicle Technology

Congress should provide funding of at least \$1 billion for a \$3.3 billion advanced battery loan guarantee program (*EISA, Sec. 135, 42 U.S.C. 17012*) for the construction of facilities for the manufacture of advanced vehicle batteries and battery systems that are developed and produced in the United States, including advanced lithium-ion batteries and hybrid electrical system and component manufacturers and software designers. The House-passed stimulus included \$1,000,000,000 for this program.

Green Chemistry

ACC and its members are committed to improved environmental, health, and safety performance, and sustainable economic, environmental, and social outcomes. The industry's commitment to these goals are reflected in ACC Responsible Care[®] program (a condition of membership in the Council), common sense advocacy designed to address major public policy issues, and research and testing related to chemical hazards. ACC member companies are leaders in Green Chemistry and Green Engineering in their operations, and have been recognized for their efforts in programs such as the President's Green Chemistry Challenge Awards. In ACC's view, "green" chemistry and engineering can provide important guidance and tools that drive innovation and improved environmental performance. Thus, "green" chemistry and engineering initiatives should provide an appropriate range of incentives and support for research and development in product and process design, but should not (and cannot as a practical matter) mandate innovation. Among the approaches to promoting "green" chemistry and engineering, ACC supports:

Research and Development Center/Sustainable Chemistry Grants

The federal government should consider developing a coordinated network of research and development centers focused on sustainable chemistry and/or sustainable engineering. No such network currently exists.



The Administration should also consider developing a grants program in sustainable chemistry that allows research and development in this area to go beyond the R&D network and that allows the private sector to participate as well.

Voluntary Programs and Incentives

Performance Improvement: Provide credit to any company that manufactures imports or uses chemicals for having a management system in place that includes process and product safety elements. To obtain credits, company systems should be subject to third party certification by representatives of a nationally recognized auditing board (e.g., Board of Environment, Health and Safety Auditor Certifications, or ANSI-ASQ-National Accreditation Board). Companies should affirm to the State that the management systems are in place and that third party certification has occurred.

Academic Curricula: The U.S. Department of Education should enhance academic curricula, particularly in post-secondary education, to cover “green” chemistry and engineering topics. Expanded training in toxicology (human and environmental), exposure assessment, life cycle analysis, polymer science and engineering, nanotechnology, and risk assessment are logical choices.

Incentives: The federal government could develop incentive programs to create a better understanding of, and commitment to “green” chemistry and engineering. The incentives include low interest loans, grants, and/or tax incentives to companies using Green Engineering or Green Chemistry.

Inter-Disciplinary Collaboration: Successful “green” chemistry and engineering is often achieved through inter-disciplinary collaboration among business, government, NGOs, and academia. The government should consider setting clear criteria and objectives for partnerships with federal agencies and academic institutions, including a clear understanding of how ownership of generated intellectual property in any cooperative R&D activities could be addressed.

Increase Recycling of Plastics, and Increase Energy Recovery

Recycling is not only good for the environment, and it is essential for businesses that have developed products which rely on recovered plastic, paper, and other materials. Virtually all commonly used plastics are recyclable, yet recycling rates remain unacceptably low, particularly given that most US communities have implemented curbside recycling, and between one-third and one-half of all MRFs provide the more efficient commingled or “single stream” collection. There are relatively simple ways to increase recycling rates, including by providing larger bins (e.g., 64 gallon roller bins for curbside collection) to handle the growing number and types of materials being recycled by consumers today. Because many communities have limited or no funding available to purchase larger recycling bins, a relatively modest one-time investment would allow communities to provide bins that recover more material, resulting in increased



carbon reduction, increased revenue from sales of recyclables, increased diversion from landfills, and an increase in the number of jobs to handle the additional collected recyclables.

Infrastructure Development to Increase Material and Energy Recovery from Waste

According to EPA in 2007 the US sent 54 percent of total waste to landfills and recovered 25 percent for recycling; only 12.6 percent was recovered as energy. Significant opportunities exist to recover more materials and create green jobs through both recycling and increased energy recovery from waste. Much of America's current material recycling infrastructure is aging, and was developed largely to recycle bottles, cans and large volumes of paper. This infrastructure should be upgraded and modernized to capture more materials for recycling, in particular including durable plastics, non-bottle rigid containers, and flexible bags and wraps.

Recovered plastic materials that are too contaminated to be efficiently recycled should be recovered as energy. Waste to energy currently provides enough electricity to supply 2.3 million homes according to the Integrated Waste Services Association. However we are currently landfilling energy in the US and could do much more to recover this material and provide electricity. The percentage of waste going to energy peaked in 1990 at 14.5 percent and has since declined to 12.6 percent. Japan recovers over 70 percent of its waste as energy. Incentives, education and sustained support are needed to develop and/or modernize this infrastructure.

Upgrade Material Recovery Facilities

Currently approximately 550 Material Recovery Facilities (MRFs) in the United States handle much of the U.S. recyclables processing. Nearly half of all MRFs are outdated and require retrofitting and new equipment in order to process the increase in materials being collected and processed, as well as new and emerging material streams that could be collected such as household rigid plastic containers, flexible packaging and plastic bags, aluminum foils. Upgrading outdated MRFs could cost an average of \$3million per MRF.

Rigid Containers and Packaging Recycling

Household rigid plastic containers and packaging are emerging recycled commodities both in the United States and globally. Currently very little reclamation infrastructure exists in the U.S. and North America to turn these recyclables into clean, discrete commodity streams for use by end markets. Most of the collected material is shipped overseas to markets for processing, turned into products and sent back to the U.S. as finished goods. The recycling bins and processing upgrades at MRFs or specific plastics recovery facilities (PRFs) will also benefit from the collection of household rigid container and packaging materials. However, additional infrastructure is needed to separate these materials for use by U.S. end markets. Market development funding is required to enable this final, important step. Market development would create new jobs as more of this emerging material commodity is captured.

Foster Partnerships to Promote Recycling

Although there are strong economic and environmental benefits to be gained from litter abatement and increased recycling, effective solutions and sustained progress in these areas can be complex and expensive. However, we have learned from a recent pilot program in California with an environmental NGO (Keep California Beautiful) and that state's Department of Parks



and Recreation that remarkable progress can be made by utilizing public-private partnerships. The plastics industry recognizes it has a role in promoting the recycling of its products, the State has an interest in diverting waste from landfills, as well as reducing costs associated with litter removal. In that particular partnership the plastics industry purchased permanent recycling bins for the state and created signage and a public education campaign. The state placed the bins in parks of its choosing and is responsible for removing collected materials. Our NGO partner has worked to increase awareness of the importance of recycling, including through earned media events. To date we have placed more than 525 recycling bins along beaches in key state parks, including along some of the most heavily trafficked beaches. We believe there are opportunities to replicate and expand this type of program, including through partnerships with other material producers, consumer product companies and NGOs on a national level to increase recycling and reduce public costs associated with litter removal, such as:

- Department of the Interior: partnership to place/increase number of recycling bins in America's national parks
- Department of Transportation: partnership to place/increase number of recycling bins along interstate highways, at airports, ports and rail stations.
- Department of Education: data clearly show that early education on litter and recycling can have dramatic impacts, so partnerships could be utilized to develop and disseminate curricula designed to reach children with age appropriate messages on these issues in grades K-12.

These types of partnerships do not necessarily require specific legislative authority or significant resource investment, and could be implemented quickly. In addition, there is also a role for the federal government to play in setting an example, in establishing national goals and priorities, and by encouraging (perhaps through Executive Order or the Council on Environmental Quality) programs and policies for all agencies and recipients of funding to follow. And, the federal government could support existing programs through research grants, and could include recycling and litter abatement as part of a public service ethic associated with any national day of service.

Additionally, there may be a role for federal agencies to play in a partnership currently being developed with various industries and Keep America Beautiful to launch a sustained, national, multi-year campaign aimed at making litter a socially unacceptable behavior. That particular partnership is currently being developed, but the impetus for the program arose from a group of staff from various federal agencies (including Interior, NOAA, and the Coast Guard) who came together to search for concrete solutions to problems of litter which ends up as marine debris. The partners anticipate using new social/digital media to reach young people and amplify messages at a grassroots level across the country.