

How Engineers Can Influence Public Officials

**Tolani Owusu, WISE 2002
National Society of Professional Engineers**

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About the Author

Tolani Owusu is a recent graduate of the University North Carolina at Charlotte with a major in Electrical Engineering. She has accepted a position with the Department of Energy at Los Alamos National Laboratory. This report was prepared as part of her participation in the Washington Internships for Students of Engineering (WISE) program in the summer of 2002. The National Society of Professional Engineers (NSPE) sponsored her participation in the WISE program.

The WISE Program

Founded in 1980, the Washington Internship for Students of Engineering is a ten-week program for up to 14 junior or senior engineering students during which they “learn how government officials make decisions on complex technological issues and how engineers can contribute to legislative and regulatory public policy decisions.” Throughout the ten weeks, the students interact with leaders in Congress and the Administration, industry, non-governmental organizations, executive office departments, Congressional committees, and corporate government affairs offices. In addition, each student researches and presents a paper on a topical engineering-related public policy issue that is important to the sponsoring society. For more information about the program, visit the WISE homepage at <http://www.wise-intern.org>.

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List of Abbreviations

AARP – American Association for Retirement Persons
ANWR - Arctic National Wildlife Refuge
ASCE – American Society of Civil Engineers
ASM – American Society for Microbiology
DOE – Department of Energy
FMS – Federation of Materials Societies
IEEE – Institute for Electrical and Electronics Engineers
MPA – Montana People’s Action
NSF – National Science Foundation
NSPE – National Society of Professional Engineers
PAC – Political Action Committee
R & D – Research and Development
S & T – Science and Technology

Executive Summary

Our public officials, as the source of the nation's law and the appropriators of federal and state funds, exert considerable influence over the future directions of science and technology¹. But relatively few lawmakers or their staffs have an engineering or scientific background. Most state legislatures are comprised of attorneys, business people, real estate and insurance brokers and educators. There are only a handful of engineers serving in public office nationwide. In most state capitals, your profession's fate is in the hands of people who know little about engineering and the type of work you do². At the federal level, only 24 members or slightly more than 4 percent, of the 107th Congress have educational backgrounds in medicine, science, or engineering³. This statistic is especially important in an era when the federal government is increasingly shifting resources to states.

These decision makers need the input of the engineering profession in order to respond effectively to complex technological issues involving competitiveness, the environment, procurement, transportation, energy, telecommunications, cyberspace, health care, national defense, and other legal, ethical and social issues that impact the work of professional engineers. For our public officials to understand and appreciate scientific and technological endeavors, it is crucial that engineers make an effort to understand and work with Congress, state assemblies and local governments⁴.

This paper explores how engineers can influence public officials, reasons for engineers to get involve in public policy, and the tremendous potential that engineers have to influence public officials as they seek ways to support and sustain

democracy – “Our Way of Life”. The paper provides a rationale and advocates the active participation of the engineer in the legislative and regulatory processes. The paper identifies several new societal pressures that make it imperative for the engineer to be actively involved in the national policy making process to better serve their own interests, the interest of the profession, and the interests of the nation.

Background

According to Webster's dictionary, policy is "a definite course or method of action selected from among alternatives and in light of given conditions to guide and determine present and future decisions." As such, public officials determine the production and distribution of society's resources to promote the welfare of citizens given that the issues have alternative solutions. The dictionary also defines an engineer as "a person who carries through an enterprise by skillful or artful contrivance." By combining these two definitions, one can point to some important reasons why engineers must work with our public officials to help disentangle the complexities associated with a technological democratic society such as the United States.

In the 19th Century, engineers played a key role in developing a modern economy with the creation of roads, canals, and railways. Engineers became highly visible by designing bridges, sewer treatment systems, communication, food, water resource development and developing industrial processes. They became highly influential and were considered role models for children of the time. In recent decades, however, many argue that engineers are far less visible in influencing political decisions⁵. Once upon a time; the engineering profession had more say on the technical and economic aspects of such issues, before society set up its political decision-making processes. Today, the engineering profession has been losing its position of being the uncontested expert on matters related to engineering and technological issues. There is a need for engineers to get involved in the political

process by contributing sound scientific and technical advice in matters involving technological and engineering expertise⁶. As stated in the WFEO Comtech April – June 2002 issue: “...*the professional engineer has the responsibility to advise the society on technology issues and to express his view on technical matters for providing support to the decision-making process*”.

The remainder of this paper explores some of the ways engineers are losing their impact on public policy. What has caused the trend? How they can recover their influence on public officials so that future complex technological issues are made with a full understanding of the technical issues involved⁷.

The information and recommendations in this paper are derived from several sources. These sources include (1) a detailed review of existing literature on the U.S. policy process and the role of scientists and engineers, (2) extensive discussions with experts and professionals from my sponsoring agency - the National Society of Professional Engineers (NSPE), (3) visits and discussions with members of Congress and selected Congressional staff, (4) Science policy experts from the Executive branch, including directors and heads of several federal and quasi-government agencies, (5) Experts from engineering firms and private engineers, (6) University professors, and (7) my own personal experience.

Introduction

Why Work With Legislators and Regulators?

The decade of the 1990s saw major changes in Congress. The Republican Party gained control of the House of Representatives for the first time in 40 years and regained control of the Senate after 10 years in the minority. There are fewer committees and subcommittees; a record number of legislators have switched parties; and Congress has undertaken steps to balance the budget and reduce the size of the federal government by moving many programs to the states. These fundamental changes make it imperative that engineers communicate effectively with Congress and state legislatures about the importance of their work. The need for engineers to become more involved in the legislative and regulatory processes in the U.S. has been summed up as follows:

Legislative agendas are increasingly dominated by issues involving science and technology, but relatively few lawmakers or their staffs have an engineering or scientific background. These decision makers need help in order to respond effectively to complex technological issues involving competitiveness, the environment, procurement, transportation, energy, telecommunications, cyberspace, health care, national defense, and other legal, ethical and social issues that impact the work of professional engineers. For our elected officials to understand and appreciate scientific and technological endeavors, it is crucial that engineers make an effort to understand and work with Congress, state assemblies and local governments⁸.

Making our Voices Heard

Engineers are constantly challenged to contribute to increasing economic growth and enhancing the well-being of society by creating products that make life simpler and safer. The engineer's contribution may involve producing fuels to improve efficiency; designing telecommunications systems to enhance communications and learning; developing transportation systems to improve our mobility; and protecting the environment. With all these responsibilities placed on engineers, one tends to forget about the government's impact on our profession.

Certainly engineers are presented with challenges to contribute to increasing economic growth; engineers must also learn to contribute to the legislative and regulatory process at the local, state and federal levels. Our public officials need our input in making complex technological decisions with sound scientific and technical decisions. Over the past year, a growing number of engineering organizations have sought to increase engineers' presence in the policy process by establishing lines of communication through members at the grassroots level⁹. Some organizations have come up with creative ways of influencing their legislators. Others have organized coalitions that go well beyond the usual allies or have stretched their organizations to take on some difficult but critical national or statewide issues¹⁰. For example a coalition of American Society of Civil Engineers (ASCE) International and Federation of Materials Societies (FMS) held Congressional Visits Days this year. By joining with eight other materials-oriented technical societies, who also belong to FMS, 13 delegations of scientists, educators, and engineers visited the offices of 25 congressmen and senators from six key states – Illinois, Indiana, Iowa, New Jersey

New York, and Pennsylvania. In addition, FMS was joined by more than two dozen other similar organizations with more than 1 million members who were also concerned with influencing their legislators who control Science and Technology (S & T) funds¹¹.

Still the declining R&D funding has motivated organizations, such as the NSPE, to keep reminding their members that engineers cannot neglect policy makers. The NSPE and its local chapters have begun to work with state legislators concerning proposed legislation that has an effect on engineers in their various jurisdictions. For example about such topics as energy reform, water infrastructure financing and Brownfield's legislation, the local NSPE chapter in Detroit was able to generate over 200 "*write to Congress letters*" in support of the initiative. Engineers must dedicate themselves to mobilizing its membership to influence and educate public officials to understand and appreciate scientific and technological endeavors.

Why Engineers must intensify their Role in Policy Process

Most engineers have not considered the fact that their work today, and indeed the growth of their own professional life, is tied very closely to what happens at the national policy level. The many competing demands on congressional appropriations are reducing resources available to federal science and technology funding. And this drives the need for engineers to intensify their role in the policy process. As shown in figure 1, there has been a historical trend decline in federal science and technology funding over time. And the fact that federal funding has declined over time is a sobering fact that must be addressed if the profession is to play its role in society. Addressing and trying to reverse the trend requires that engineers present their demands to congress more forcefully.

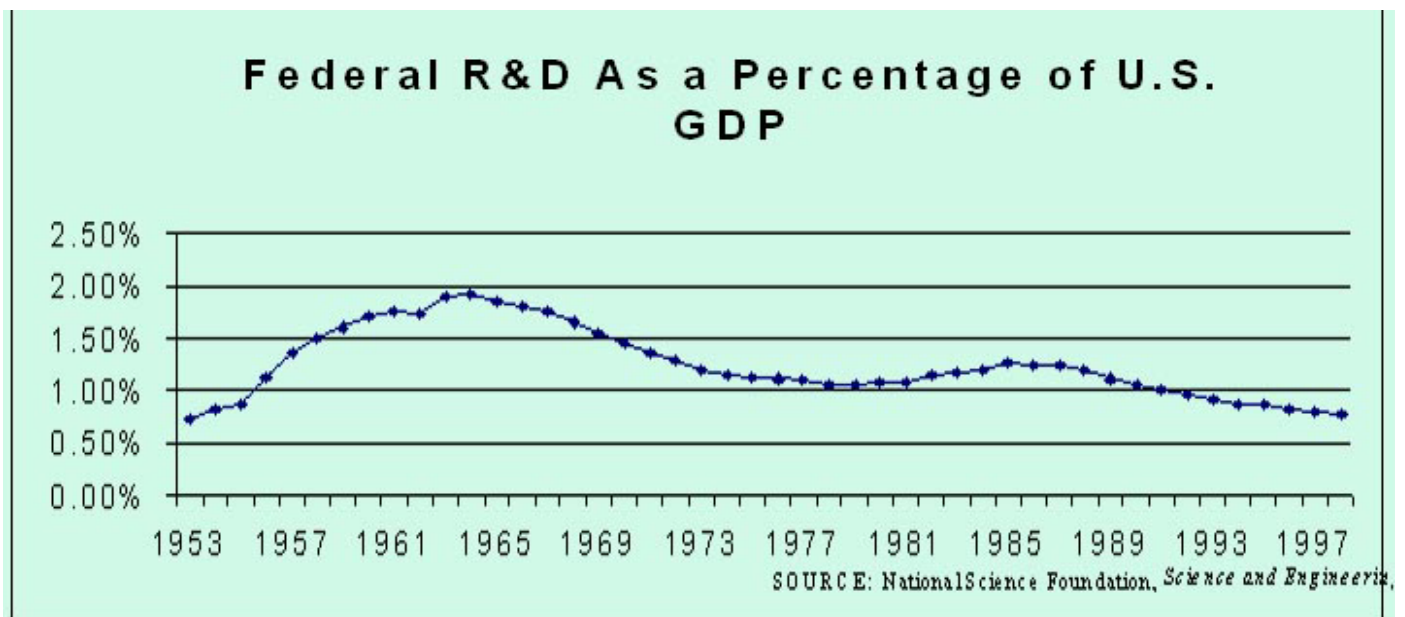


Figure 1 Source: NSF, Science and Engineering 2001 indicator

Engineering entails using one's skills to design, construct and operate systems that directly improve the quality of life. However, engaging in government relations is not so clear-cut and the process is influenced by many variables. Therefore to formulate a thorough and effective public policy depends on the actions taken by individuals who possess knowledge of the political system as well as engineering. It is not easy to find individuals with this unique combination of technical knowledge and political skills. And this is where engineers have historically suffered in their effort to get their views across. This problem is especially acute at the state level.

As one observer has explained, most state legislatures are comprised of attorneys, business people, real estate and insurance brokers and educators. Nevertheless, there are only a handful of engineers serving in public office nationwide. In most state capitals, your profession's fate is in the hands of people who know little about engineering and the type of work you do¹². At the federal level, only 24 members or slightly more than 4 percent, of the 107th Congress have educational backgrounds in medicine, science, or engineering¹³. This statistic is especially important in an era when the federal government is increasingly shifting resources to states. Like their federal counterparts, state-level policy makers also require information and advice about science and engineering in order to make sound decisions. As states have assumed increasing responsibility for economic development, environmental protection, transportation, health care, job creation, and education, this advice has become even more important¹⁴. Therefore it is important for engineers to become active members of their local chapters and participate in shaping and sustaining public policies that reflect their values and priorities. Engineers need to target and build their capacity, effectiveness and intensify their role in state and local public policy advocacy.

The Federal and state legislatures consider a large number of legislation each year, but few realize how many of these bills impact our lives, our families, and our profession. Legislatures consider several issues such as what to do about basic and applied research, the development and commercialization of emerging technologies, strategies to conserve and to provide adequate supplies of clean water, energy for domestic and industrial purposes, and ways to reduce and manage our wastes while protecting the environment, and homeland security. Engineering, scientific and technical organizations like NSPE can play an important role in Washington by helping members of Congress to understand the technical implications of complex public policy issues. But one major influence on a legislator's vote is the wishes of the constituencies that elected them. It is true that turnover in the legislature has not been brisk and legislators tend to win re-election on a regular basis. But it is also true that a very vocal group, especially at the local level can significantly shape what a legislator does to an election¹⁵.

Despite the often-expressed concern about voter apathy, it is still true that when politicians see people being mobilized to vote, it impacts their decisions. An example of a politician's response to voter mobilization occurred in Montana where a state legislator became responsive when Montana People's Action (MPA) publicized the problem of mobile home abuses in his district.... and communicated their concern indicating that the group was working to register people who live in mobile homes. *"Thanks to the press, he knew that we were doing massive voter registration," said MPA director Jim Fleishmann, "By the time we got around to having an accountability session with him, we got him to agree to keep our bill intact"*¹⁶. The important point is, engineers must be made aware that their voice and

votes do matter in the political arena and must work to make their voices heard.

Professional Duty

One key policy advisor has summed up the interface between politics and science and engineering as follows, *“The scientific [engineering] enterprise faces dramatic change and the need for scientific statesmanship has never been greater – both nationally and internationally. The scientific community has the opportunity and responsibility to work and argue persuasively for both the long and short-term benefits of all federal investments in the future. The scientific societies can play a leadership role but it is of paramount importance that individual scientists [engineer] work to establish familiarity, credibility and trust among their congressional representatives before the times of crisis; the stakes are high”*¹⁷. Engineers can speak for their profession or organizational interests in front of the legislature and the governor by giving testimony to committees. One example might be a highway engineer explaining the potential environmental impact of widening an interstate, or adding an off ramp. Another example might be biotechnology experts talking about the pros and cons of labeling and/or controlling genetically modified organisms. As Dr Neal S. Lane, former Director of the Office of Science and Technology once said: *The message to you today is that if you don’t take it as one of your professional responsibilities to inform your fellow citizens about the importance of the science and technology enterprise, then that public support, critical to sustaining it, isn’t going to be*¹⁸. He went on saying, *“you are needed more than ever to be visible and vocal in your communities. This requires your presence...outside the walls of your laboratories and the gates of your universities to a much greater extent than in the past”*¹⁹.

Expanded list of Problem Solvers

The nature of our democratic system is such that groups and individuals compete for public resources to support their profession and occupation. Recently, in light of the events of September 11, there has been an expansion in the list of professions and individuals offering their services and asking for resources to support their claim as “*problem solvers*”. It is important for engineers to intensify their presence in the federal and state legislatures. The recent effort by software designers to attract attention in light of new emphasis on homeland security is a case in point. Historically, software designers had relaxed on the assumption that the demand for their product and services is automatic. They have quickly come to a realization that they also need to intensify their role in policy process to be able to be major players in the national security market²⁰. What they will be able to extract from the available resources is a portion not available to any other group.

Educating Policy Makers

One cannot better express the role and importance of the engineer as an educator of policy makers than the following excerpt from the Boston Globe, December 12, 1999:

“In our rapidly moving culture where people can shut out information, we need to hear from the people who are doing the research, making the breakthroughs, and inventing the future. All I am asking is that every scientist [engineer] spends an hour or two each month being an active citizen. Do your duty and educate your fellow countrymen about the exciting world that awaits us. Help us understand what is at stake and we will help you find the resources to achieve these great breakthroughs. Every day scientists [engineers] work in labs and wind tunnels

and at computers to make our country a better place. Surely a little citizenship is small enough price to pay to do the same thing in the public arena, after all, our health, prosperity, and survival are at stake"²¹.

What on its face may sound as a negative and insurmountable difficulty facing our profession actually it explains why as a profession we decided to entrust so much responsibility to our professional organizations. Engineers have formed organizations and entrusted to these organizations the responsibility to organize individual energies and channel this energy into influencing and educating public officials. This does not make the individual engineer a passive observer of what his or her organization is doing. Indeed the education of public officials must be done by individual engineers sometimes working under the umbrella of the organization. Our public officials need help in order to respond effectively to complex technological issues. As Newt Gingrich, the former U.S. Speaker of the House once said:

*"...scientific concepts sometimes elude the vast majority of elected officials. Lack of scientific understanding undercuts support for the pursuit of further understanding, which fosters deeper ignorance, which in turns further erodes support for battling that ignorance. It's vicious cycle"*²². And again C.P. Snow once wrote:

*"I want to emphasize that the primary responsibility for making the case to Congress and the American people belongs to the science and technology community. We are the ones who are the most familiar with both the potential and the limitations of science and technology. Scientists and Engineers have the future in their bones"*²³.

Strategies for Expanding the Influence of Engineers

Unfortunately, without a huge number of people who will speak out about specific issues, it is extremely difficult to influence policy. This is especially true today when the demands on the legislative process has increased and become very complex. The cost of inaction in the legislative process is illustrated by the failure of welfare advocates. As one legislator describes it,

“Very little mail, very few phone calls and only muted lobbying on behalf of [welfare advocates] position. They were great on saying, “Here are our principles.” But when it came down to bras tacks, they just weren’t there”²⁴.

As previously mentioned, how does the engineering profession expand its influence on a large scale? The logical beginning is to find ways to pull together the engineering community to vigorously participate in the policy process and draw resources to the profession. The approach must serve to counter observations made by noted leaders in the profession. As an example of this new commitment by engineers, the following observation by Dr Merrilee Mayo (currently President of the Material Research Society, former Congressional Fellow,) is noteworthy. Dr Mayo has characterized the approach of the engineering community as *“altruistic”* when it comes to advocating governmental funding for S&T. The view that engineering is critical to the growth and sustainability of our society is widely recognized. However, there is the erroneous belief that our public officials recognize the contribution by the profession, and will fund S&T without our input since *it’s the right thing to do*. In fact, without the input by the engineer, the funding of S&T takes place only at the discretion of the legislator and may be based on factors unrelated to the growth of the profession.

The future growth and contribution of the profession, the attainment of our commitment to protect the society in which we live and work, and the very legitimacy of the engineering profession cannot be left to the altruism of a legislator²⁵.

Engineers must be proactive and pull together to vigorously participate in the policy process because “small isn’t beautiful. Small is less powerful”²⁶.

Fear of lobbying

There is a sense that engineers have not done too well in mobilizing resources in support of their profession. This view is not the view of engineers but rather the views of a larger public as expressed by the *Washington Post* (October 18, 1999), “*Why is it so hard to get Washington to double the budget for federal scientific research? The answer is not logic but politics. I have found scientists [engineers] and investors to be among the least effective lobbyists and have watched more focused special interests receive more money than they deserve while the future was starved of resources*”²⁷.

But while most engineering organizations recognize the need for engineers to advocate and lobby for their profession, they also acknowledge that engineers fear to lobby and think is a dishonorable process. To many, lobbying is something other people do, people who wear fancy clothes and buy politicians lunch at expensive restaurants. But lobbying or more simply, trying to influence those who make policies that affect our lives, is something anyone can do²⁸. Theoretically, it is something all engineers must do if they believe in a good cause and in a democratic form of government. The individual engineer must understand lobbying as an accepted business practice in the field of public policy making.

As the former Representative George Brown summed it: *“Researchers must not only do a better job of linking their work to a set of concrete national goals—of grounding that work in the present—but must also view their community as an integrated and politically sophisticated entity. Otherwise, better-organized interest groups will win the competition for sound government funding at both federal and state levels”*²⁹.

Reasons for Engineers to lobby

The headlines are replete with examples of individuals who accepted the challenge to change a condition they did not like by working together to bring pressure on the political apparatus. Take the case of Gerry Jensen, a single mother struggling to raise her son in Toledo, Ohio, without the help of a workable child support system. She put an ad in a local newspaper to see if there were other moms who wanted to join her in working for change. There were. Over time, they built the Association for Child Support Enforcement, or ACES, which has helped change child support laws not just in Ohio, but across the country. There is also the case of Families of Alzheimer’s patients who worked together **as a team** through the Alzheimer’s Association, and convinced the government to invest resources into research for a cure. Another example of the benefits of a team effort is the emergence of ‘Mother Against Drunk Driving’ who got together and convinced dozens of states to toughen up their drunken driving laws. The result has been a marked decline in drunken driving deaths. It is also important to recognize that people can change laws.

Many are skeptical about the ability of ordinary individuals to make a difference in the sense of getting laws and policies changed. But the history of the United States contains numerous examples of instances where individuals have triggered major institutional changes in the face of major obstacles. Our history tells about people losing their lives fighting racist “Jim Crow” laws. Women did not even have the power of the vote when they started their struggle for suffrage. Changes in child labor laws, public schools, clean air and water law, social security were not easy to achieve, and some took decades. What is true for all these changes is that they all took the active involvement-the lobbying-of thousands of people who felt something needed to be changed. It is also important to recognize that lobbying is a democratic tradition. The act of telling our policymakers how to write and amend our laws is at the very heart of our democratic system. Lobbying has helped keep America’s democracy evolving over more than two centuries. One consolation is that lobbying is easy.

Many think of lobbying as some mysterious rite that takes years to master. It isn’t. One can learn how to lobby-whom to call, when, what to say-in minutes. While there are a few simple reporting rules an organization needs to follow, it isn’t complicated. Lobbying is easier and more effective when many committed people work together. One person does not have to do everything or know everything. The effort is rewarding because policymakers need your expertise. What gives our organizations a distinct advantage is that few institutions are closer to the real problems of people than nonprofits and community groups. They see problems first-hand. They know the needs. They see what works and what doesn’t. They can

make problems real to policymakers. They care about the problems. Their passion and perspectives need to be heard. Every professional lobbyist will tell you that personal stories are powerful tools for change. People and policymakers can learn from your story.

One can derive some personal satisfaction in the fact that lobbying helps people. Some people become concerned that lobbying detracts from their mission, but quite the opposite is true. Everything that goes into a lobbying campaign—the research, the strategy planning, the phone calls and visits will help fulfill your goal whether it is finding a cure for cancer, beautifying the local park, or helping some other cause that helps people. You may not personally provide a direct service, but through your advocacy work, you enable thousands of others to do so. Since lobbying often targets particular issues and causes, it helps in finding real solutions to problems.

People thinking creatively and asking their public officials for support can generate innovative solutions that overcome the root-cause of a problem. The views of local nonprofits are important. Increasingly, the federal government has been allowing local governments to decide how to spend federal money and make more decisions than in the past. This change gives local nonprofits even more responsibility to tell local policymakers what is needed and what will work. And because more decisions are being made locally, your lobbying can have an immediate, concrete impact on people in need. Lobbying advances your cause and builds public trust. Building public trust is essential to nonprofit organizations, and lobbying helps you gain it by increasing your organization's visibility. Just as raising funds and recruiting volunteers are important to achieving your organization's

mission so is lobbying. You miss out on an important opportunity to advance your cause if you don't think as much about relationships with local, state, and federal government³⁰.

A recent activity of the NSPE reinforced the need for engineers to get involved. It is true that most people have a negative perception about lobbyists and lobbying, but as an engineer, be reminded that it took considerable effort to get the attention of legislators during the debates of the most extensive energy bill (H.R. 4) - the *Securing America's Future Energy Act of 2001*. The bill provides for limited drilling in the Arctic National Wildlife Refuge (ANWR), more than \$33 billion in tax credits and incentives, and a limited increase in vehicle fuel efficiency. It also provides for expansion of natural gas and electricity, encourages greater development of renewable energy in the Department of Energy (DOE) programs which conduct next generation research into renewable sources of energy including: solar, wind, geothermal, and hydropower³¹. Consistent with its energy position statement, NSPE actively lobbied in support of H.R.4.

How could engineers be heard – Lobby

Most community-based organizations have some resources and power they can use to influence policies, if they understand the process³². After a debate that lasted for more than a decade, Congress and the Internal Revenue Service decided that nonprofits have a valuable role to play in the public policy process. The 1976 Tax Reform Act divides lobbying into two types— direct and grass roots lobbying.³³

Direct lobbying

Direct lobbying is a special and essential type of nonprofit advocacy that shapes public policy in arenas of influence at the local, state, and national level³⁴. Direct lobbying occurs when an organization communicates its position with regard to legislation or legislative proposals directly with legislators, legislative staff, executive branch officials, and executive staff. For example, the government relations unit of your engineering organization may inform legislators urging them to oppose a universal board of licensing legislation. Therefore, engineers can urge legislators to pass laws and provide funds that solve a problem and also can impede actions that would have negative impacts on issues and communities. In addition, they can take the initiative to promote solutions that they know will work. Develop an idea, support it with solid information and stories about how your idea will make a difference, and then lobby until your idea becomes law³⁵.

Grassroots lobbying for engineers

Grassroots lobbying involves educating and activating the public to persuade elected and appointed officials to vote to support a position. A communication is considered lobbying (a “grassroots call to action”) if it states that the reader should contact a legislator, or if it provides the legislator’s address and/or telephone number, or provides a post card or petition that the person can use committee that will vote on the legislation³⁶. A grassroots lobbying effort is most frequently triggered by a “call-to-action” phrase such as “call your congressperson today to ask them to vote YES on HR 123” and are commonly used in action alerts and press releases. In its most effective form, grass roots lobbying is simply giving your local chapter a

voice that encourages the people you serve to be their own best voice about how proposed legislation will affect them³⁷. The engineer is most effective and responsive at the grassroots level by identifying proposals that will affect his or her work alerting people to proposals that will touch their lives and coordinating efforts to inform and persuade decision makers to develop policies and funding streams that will address concerns responsibly³⁸. A strong grassroots network of constituents represents a vote generating engine that a good candidate or elected official cannot afford to ignore. Numbers count in politics. Numbers of calls, letters, visits and letters to the editor have a profound influence on public officials. The member's strength is their personal stories and their power as constituents of elected officials. As Congressman George Brown once said to IEEE-USA at its 1997 Technology Policy Symposium:

"You also need to use your membership to engage in a broader process of educating legislators and the public. Professional science and engineering societies should be using their local chapters and regional sections to interact with Members of the House and Senate. These Members should be helped to realize that these seemingly arcane debates about technology development have a local face at high technology companies in their state or district, or at colleges and universities at home. They need to gain a better understanding of your world and the realities of our science and technology efforts." Engineers need to get involved in their local chapters in order to build a powerful broader process of educating legislators and public.

Networking by Engineers

To build a powerful local chapter one should use all resources especially your members who have personal or business relationships with, and reside in the legislator's district and who are willing to contact the legislator on issues of concern. You can also recruit recent graduates, retiree engineers, members who are willing to contact their elected officials on behalf of the issue, door-to-door canvassing, phone and fax trees and setting up tables and distributing flyers to groups to participate in your public policy work³⁹. One suggestion for building networks is by starting a phone tree or email list so that you have a means of contacting everyone who shares your interest. The idea is to share the burden and get everyone involved⁴⁰. Building relationships with other engineering societies can further deepen the network. For instance, if it is a technical issue of interest to IEEE members, certainly it may affect other engineering disciplines. Investigate what other societies and their local sections are doing. If your issue concerns your community or state, any number of organizations and groups may be willing to join forces. You may have to educate them on the issues, but once they understand how they can be affected, they will look for ways to endorse and support your efforts⁴¹. Some campaigns are too large in scope or target or importance to be led by a single organization. They demand a coalition⁴². The idea is to be able to link issues where necessary, and to raise the political cost to the legislator who refuses to recognize an extensive and coordinated network of engineers.

Building relationship with public official

To protect your interests and encourage the best possible solution to the problems, it is essential to become politically active as an individual. It means

understanding the issues and communicating your views to your public officials. It means establishing a relationship with public officials, including agency staffs that make policy decisions about the laws, regulations and rules you have already listed. You may also become a credible resource for advice and information by inviting them to visit your company, university, organization or community group, and by volunteering to work on their political campaign; or by inviting them to local seminars and engineering or technology policy conferences related to legislative issues⁴³. You may also attend fund-raisers and assisting in campaign financing for your elective officials. Other possible sources of campaign funds are PACs sponsored by your employer or a state society PAC. Contribute to these PACs and encourage them to contribute to your legislator. More importantly, the most important way to learn the art of legislative contacts is through mentoring. Ask an experienced political activist such as your federal government relations organization to assist or accompany you on your initial visit with your legislator.

The Tools of the Trade

But while nearly everyone agrees that a grassroots network can be effective, not everyone believes that will be enough⁴⁴. They point out how difficult it is to get volunteers who have expressed an interest to take action when needed. They can be activated by first:

- Providing briefings, stories, and informational materials to win people's support.
- Offering training on the legislative process and communicating with legislators.

- Identifying what you want them to do and suggest specific steps to take. Keep it simple⁴⁵.
- Issuing an Action Alert to your network members that asks them to take a specific action by a certain date, giving them necessary contact information to help them respond. Contacts should be scheduled to coincide with key steps in the legislative process, including bill introduction, hearings, legislative mark-ups, subcommittee and committee votes, floor debates and votes and conference committee deliberations⁴⁶.
- Asking them to call their legislators, especially those who have made an effort to get to know the public official prior to the home stretch of the decision-making process. Callers should identify themselves by name and address and leave a clear message that will fit on a message slip.
- Likewise, draw on your existing ties with the media. There are number of techniques for urging them to get your message out; for example, press releases, letters to the editor, writing editorials supporting your position, TV and radio interviews.

Making Engineers aware of the Programs available to them

Most engineering organizations including the NSPE have developed websites and other information resources to assist engineers who wish to be involved in the legislative and regulatory process⁴⁷. For example the NSPE website has a link to “Government Relations”, outlining efforts that best target both federal and state

issues of importance to engineers. Another valuable resource is the link to the *Handbook: How to Contact, Assist, and Influence Government Officials*. The handbook answers questions such as:

- Why work with legislators and regulators?
- What is the role of legislative & governmental affairs committee?
- “How do I develop a lobbying program?”
- “How do I find and make lobbying contacts?”
- “How should I meet with legislators/government officials?”
- “How should I build coalitions and network with other organizations?”

Besides engineers knowing the resources available to them it is also important for engineers to understand the political system. Understanding the legislative system and getting involved in the public decision-making process, they can make a great contribution to solving the types of social problems as well as become more influential in advancing their own personal and professional interests⁴⁸.

Understanding Congress as a System

An engineer does not have to be an expert in the legislative process but it helps to be at least familiar with the structure and functioning of the Congressional system. Figure 2 summarizes the basic composition of Congress. The work of Congress is supported by a host of committees and sub-committees that are probably the most important units to the engineer since the major decisions concerning a law are often determined at these levels. The committee level also affords the engineer an opportunity to make an important as an expert witness or a resource person. What emerges out of committee deliberations becomes the text for debate on the floor of the congress. At the floor level, the opportunity to influence the legislation is significantly reduced. One author has suggested some key guidelines for interacting with the congress.

Senate + House of Representative	=	United States Congress
House of Representatives	=	435
Senators	=	100

Figure2: Basic Composition of U.S. Congress

The guidelines and cautions suggested by the Coalition for Technology Partnerships and the Science and Technology Working Group, and intended to alert the engineer as to what to expect include the following:

- The legislative process is deliberately complex, ensuring that proposed new laws and policies receive the fullest possible consideration. Most bills introduced never receive any action at all, and few of those considered become law. A legislative proposal may be reintroduced year after year before it gains consideration.
- Every legislative body has informal customs and practices. These customs and practices can be as important as the body's formal rules. For example, key policy decisions are made by the leaders in some Congresses, by a policy committee in others, and by the majority party members in yet others.
- All of the government including the Congress is political. Candidates for most federal legislative seats are nominated through partisan political processes and chosen in partisan elections. The political party that wins a majority of seats in each legislative body also wins the right to pick the leaders of that body, and often the staff.
- Legislative proposals may be weighed subjectively. They are often considered not only on their merits but also on these basic political questions:
 1. How will the bill affect the legislator's reelection prospects?
 2. What are constituents (i.e. citizen voters) saying about the issue?
 3. What are the views of the news media, community and business leaders, and local interest groups?

4. What would be the impact on the economy and jobs?
5. Are any significant local campaign supporters taking a public position on the issue?
6. What is the advice from the legislator's staff members and advisors?
7. Is this issue consistent with the legislator's previous votes on related matters, and with his or her political and economic philosophies?
8. The legislative process is customarily very open. Every interested citizen usually has the opportunity to offer inputs and express opinions at various stages of the process.

Conclusions and Policy Implications

Like it or not, engineers cannot afford to sit on the sideline while others shape our physical environment and public policy. “All life is a game so know the rules and learn how to make them work for you”⁴⁹. And with that, we have come full circle and are again faced with how we can influence our public officials, distrust for the process, and feelings of futility. The rules require that when we believe in something, we speak up⁵⁰.

The late Speaker of the House “Tip” O’Neill is credited with saying, “All politics is local.” What he meant is: contact your congressman, senator, and other public officials in your home district. Tell them what you want. It’s not complaining, it’s data they use to help make decisions. Engineers must realize that developing technologies does not solve problems of public policy. That is why their participation in the legislative and regulatory process is vital now. Who better to sit on local committees about land use? Who better to serve in Congress, the Cabinet, and The White House?

As an engineer you have a professional duty. It is up to you to widen your horizons, be a renaissance engineer - that is an engineer for the 21st century, get involved in public policy, don’t be afraid to run for office. Stand for practical, cooperative solutions, bring your expertise to your public officials and make them want to listen to you. Most important, go out and change the world. Make it a better place and improve the quality of life for all the people of the earth. Isn’t that what engineering is really all about⁵¹?

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