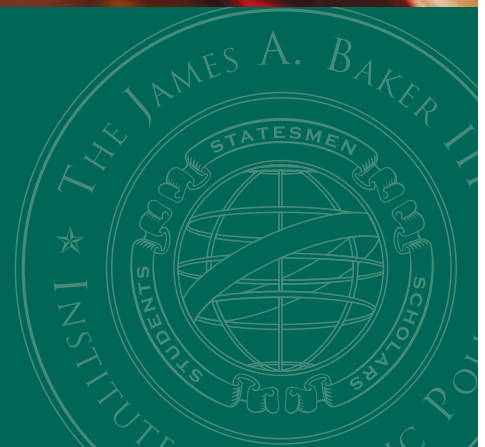




POLICY RECOMMENDATIONS FOR THE NEXT ADMINISTRATION

JAMES A. BAKER III INSTITUTE FOR PUBLIC POLICY
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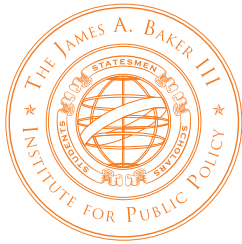
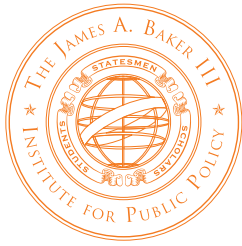


TABLE OF CONTENTS

Preface	3
Recommendations for the Next Administration	
A Letter to the President	4
Maximizing NASA's Potential in Flight and on the Ground	19
U.S.–Russia Relations	34
Information and Technology Policy	47
Economic Policy	58
The U.S. Health Care Crisis	71
U.S. Gasoline Policy	82
Science and Technology	94
Needle Exchange Programs	116
Human Embryonic Stem Cell Research	123
Fellows Biographies	
Edward P. Djerejian	135
George W. S. Abbey	136
Joe Barnes	137
Christopher Bronk, Ph.D.	138
Leslie Countryman	139
John W. Diamond, Ph.D.	140
Vivan Ho, Ph.D.	141
Amy Myers Jaffe	142
Neal Lane, Ph.D.	143
William Martin, Ph.D.	144
Kirstin R. W. Matthews, Ph.D.	145
Kenneth B. Medlock, III, Ph.D.	146
John Muratore	147



PREFACE

As he takes office, Barack Obama confronts challenges more daunting than any president in a generation. Meeting these challenges successfully will require leadership, bipartisanship, public support, and above all good public policy. Resident fellows of the James A. Baker III Institute for Public Policy at Rice University offer the papers collected in this volume as their contribution to public debate on the direction our country should take on some key domestic and foreign policy issues. Each paper expresses only the views of the author and not necessarily those of the Baker Institute. All are serious efforts to suggest public policy that will work.

In some instances, the recommendations are obvious and require only political will. In others, the recommendations challenge conventional wisdom and propose innovative solutions to old problems. The economy, energy, Russia, and the Middle East require prompt action. Drug policy, space policy, increased investment in information technology, health care, and science policy raise vital issues that must be addressed in the longer term. We intend these papers to assist policymakers in the new administration as they assume their heavy responsibilities. The papers are brief, clear, and feature practical proposals. We also think they are important. Public policy is partly about politics, partly about ideas. Our hope is that the men and women who now have the responsibility to act will find the ideas presented here helpful as they chart the course of the Obama administration.



JAMES A. BAKER III INSTITUTE FOR PUBLIC POLICY
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A LETTER TO THE INCOMING PRESIDENT

EXCERPTED FROM

*DANGER AND OPPORTUNITY:
AN AMERICAN AMBASSADOR'S JOURNEY THROUGH THE MIDDLE EAST*

BY

THE HONORABLE EDWARD P. DJEREJIAN

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JANUARY 14, 2009

A Letter to the Incoming President

THESE PAPERS WERE WRITTEN BY A RESEARCHER (OR RESEARCERS) WHO PARTICIPATED IN A BAKER INSTITUTE RESEARCH PROJECT. THE RESEARCH AND VIEWS EXPRESSED IN THESE PAPERS ARE THOSE OF THE INDIVIDUAL RESEARCHER(S), AND DO NOT NECESSARILY REPRESENT THE VIEWS OF THE JAMES A. BAKER III INSTITUTE FOR PUBLIC POLICY.

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A Letter to the Incoming President

Baker Institute Founding Director Edward P. Djerejian's new book Danger and Opportunity: An American Ambassador's Journey Through the Middle East (Simon & Schuster Threshold Editions, September 2008) begins with an open letter to the president of the United States.

Djerejian, who served as U.S. ambassador to both Syria and Israel as well as assistant secretary of state for Near Eastern affairs, calls for the Obama administration to adopt a strategic and coherent approach to the broader Middle East. His approach advocates a fundamental shift in U.S. foreign policy in the region from conflict management to conflict resolution, while framing the need for settlement of the Arab–Israeli conflict in the context of the larger forces in the Muslim world. He calls for sustained and focused U.S. engagement in South Asia, especially Afghanistan and Pakistan, where the real struggle against Islamic radicals and terrorism is being waged, as well as efforts to resolve the Kashmir issue between India and Pakistan.

We must not try to impose our own political structure on the Arab and Muslim world, Djerejian states, but we can help foster a democratic way of life in conformity with the cultural context of the region's own mainstream values and ideals. To do so, the United States must learn to deal with the complex religious, ethnic, and cultural factors at play in the broader Middle East.

Djerejian's open letter to President Barack Obama is below.

Dear Mr. President:

I have had the privilege of serving eight United States presidents, from John F. Kennedy to William Jefferson Clinton, in times of peace and war, in both the United States military and the Foreign Service. One of the positions I held at the White House and the National Security Council was special assistant to President Ronald Reagan and deputy press secretary for foreign affairs. There I caught firsthand a glimpse of the power and heavy responsibility of the presidency and, also, of the loneliness of the occupant of the Oval Office at times of critical decision-making.

A Letter to the Incoming President

During President Ronald Reagan's second term, tensions in South Asia over Afghanistan and between India and Pakistan over nuclear weapons were on the rise. We scheduled an interview for the president with a prominent journalist of the Times of India, to give the president an opportunity to underscore United States policy goals in the region. There were some key points the president's advisors thought he should make, and I was assigned the task of ensuring that this was done. Whenever I entered the Oval Office, I would always have a sense of awe at the power and responsibility the incumbent held. This time was no different. As I proceeded to brief the president just before the interview, I stood dutifully in front of his desk, referred to the talking points we had prepared for him, and reiterated the key statements he should make.

I wasn't sure the president had focused on them, so I did something I should not have done. I walked behind the desk and, leaning over the president's shoulder, pointed to the key phrases. I thought we were alone in the Oval Office, but a White House photographer was in the room and caught the scene. Several weeks later I found on my desk a signed photo of this moment, with the following annotation, "To Ed Djerejian. Who says we don't take our work seriously? Very best wishes and regards, Ronald Reagan."

"The Gipper" had seen right through my excess of zeal and made his point in a most gracious manner. So it is with this sense of humility that I, as an American diplomat who has pursued our nation's interests in this part of the world for over thirty years and who has served on both sides of the Arab-Israeli divide as United States ambassador to Syria and Israel, would like to share with you, the next president of the United States, some thoughts on the key challenges in the broader Middle East and the Muslim world at this time of danger and opportunity.

In a speech at Meridian House in Washington, D.C., in 1992, when I was assistant secretary of state for Near Eastern Affairs, I said, "The United States government does not view Islam as the next 'ism' confronting the West or threatening world peace.... Americans recognize Islam as one of the world's great faiths.... Our quarrel is with extremism, and the violence, denial, coercion, and terror which too often accompany it." It was clear to me then, some nine years before 9/11, that with the end of the Cold War and the defeat of communism the next "ism" the United States and the international community would confront would be extremism and terrorism. The critical

A Letter to the Incoming President

struggle of ideas between the forces of extremism and moderation in the Muslim world is a generational challenge, one the United States can influence but not decide. That task is in the hands of the Muslim people themselves.

It is important to avoid politically rhetorical flourishes that cannot produce the anticipated results. As with the “War on Drugs” and the “War on Poverty,” the misnamed “War on Terror” will not end with a dramatic raising of the flag in a clear moment of victory. These are worthy causes, but they are long-term struggles that need to be addressed boldly and intelligently; sloganeering should not distort good public policy. Terrorism is a lethal subset of the larger struggle of ideas between the forces of extremism and moderation, and we must combat it with all the means available to us. The option of military action is always available to you and the Congress when the national security of the United States is threatened, but guns alone cannot achieve success in the overall campaign against terrorism. That task requires a more broad-based and comprehensive strategy.

United States policy should therefore be aimed at what we can do to strengthen the moderates and marginalize the extremists and radicals, be they secular or religious. This will require all the tools of bilateral and multilateral diplomacy available to you for conflict resolution, public diplomacy, focused intelligence assessments, military assistance and training, special operations, helping countries build representative institutions, and facilitating political, economic, and social reforms and development. Overall, the wiser course will be to avoid imposing solutions from the outside. Instead, you should adopt effective policies and actions that promote solutions that are mainly the outcome of the efforts of the people and countries of the region themselves. Our helping to alleviate the causes of frustration, humiliation, and deep-rooted grievances in the region, which extremists and terrorists exploit for their own political ends, can do much to marginalize the radicals and terrorists and strengthen the moderates.

I was brought up in the school of diplomacy that advocates negotiating differences and, when possible, seeking peace with one's enemies and adversaries. That is the ultimate task of diplomacy, bolstered by our military credibility. Unilaterally isolating adversaries and breaking off communications deprives us of essential tools to pursue our national security interests.

A Letter to the Incoming President

Talking with a clear purpose in mind is neither a concession nor a sign of weakness, especially for a global power such as the United States. At the same time, our diplomacy should never be carried out in a way that indicates a lack of United States resolve. While Ronald Reagan stigmatized the Soviet Union as the “Evil Empire,” his administration negotiated in a determined manner with the communist regime and achieved positive results.

I had the opportunity in 1969, early in my career, to have a conversation with Ambassador Raymond Hare, a veteran Foreign Service officer. In diplomacy, he told me, it is essential to master your opponent's argument and position as completely as possible. You should then explain your opponent's position to him as completely as possible in terms better than he himself could express. Ipso facto, you have disarmed him to an important extent. Then, you explain, as comprehensively as possible, what areas of agreement may exist. The seed of compromise is planted. This method is much better than a mere statement of position, under instructions that may serve only to antagonize your interlocutors. Never put your opponent in a corner. Never force him to strike back — unless, of course, that is your purpose. Always allow him a way out, Hare concluded, preferably in the direction of your point of view and position. This is not a bad formula for any United States administration to follow in the conduct of its diplomacy.

The absence of dialogue and engagement with adversarial regimes and groups serves only to polarize situations and promote miscalculations, even conflict, especially in the broader Middle East. You should therefore have your secretary of state carefully prepare to engage Iran and Syria in a major strategic dialogue on all the issues between us, in a serious effort to determine what middle ground there may be to build on. Through such comprehensive engagement, with all the key issues on the table, the prospects for getting these countries to change their behavior and accommodate United States interests on such crucial issues as nuclear nonproliferation and Arab-Israeli peace could be greatly enhanced.

As I will contend in this book, the road to Arab-Israeli peace goes through Jerusalem, not through Baghdad or Tehran. Direct face-to-face negotiations between Israel and its immediate Arab neighbors — the Palestinians, Syria, and Lebanon — are the key to peacemaking. While the other countries in the region have an important role to play in bolstering peace efforts, the

A Letter to the Incoming President

focus must be on the parties to the negotiations themselves. The core political issue in the Middle East remains the Arab–Israeli conflict, especially the Palestinian issue, which has strong resonance throughout the Muslim world. For too long this conflict has been exploited as a pretext for regimes in the region not to carry out major political and economic reforms and to secure their positions of power. Any United States administration that doesn't grasp these realities and the urgency of resolving this conflict will face recurrent crises that it will be forced to address on a case-by-case basis, often distracting the government from other priorities at times not of its choosing.

The most effective approach is to steer United States policy from conflict management to conflict resolution. Putting out intermittent fires between Israel, Lebanon, Syria, and the Palestinians is a short-term and insufficient strategy. Instead, the United States must take the lead within the international community and act in its traditional but tarnished role as an "honest broker" between the Israelis and the Arabs, seeking to bring the parties to the negotiating table under the principled framework of the Madrid Peace Conference and the "land for peace" formula embodied in United Nations Security Council Resolutions 242 and 338.

Mr. President, to succeed in this major effort, you must take the lead and invest the power of the presidency in peacemaking through whatever modalities you choose. When United States presidents have displayed the political will and courage and have engaged their administrations in serious peacemaking, there has been progress, as evidenced, for example, by President Nixon in the disengagement agreements in 1974 after the Yom Kippur War, by President Jimmy Carter and the Camp David Accords of 1978 and the Egyptian-Israeli peace treaty of 1979, and by President George H. W. Bush and the Madrid Peace Conference of 1991. President Clinton, while not achieving a peace settlement, did succeed in narrowing the issues between the Israelis and Palestinians at Camp David and Taba in 2000–2001. President George W. Bush's call for a two-state solution in 2002, with a state of Palestine living in peace and security next to the state of Israel, was an important policy statement that should be translated into deeds in the Israeli–Palestinian negotiations initiated at Annapolis in 2007.

A Letter to the Incoming President

While progress toward Arab–Israeli peace, or even the attainment of that peace, will not end extremism and terrorism, it will do much to eliminate a major cause that the extremists exploit for their own ends and put the onus on radical groups such as Hamas and Hezbollah to justify continued armed resistance and terrorism. It would also do much to restore America's standing and credibility in the Arab and Muslim world.

Too often, from one administration to another, United States foreign policy is diverted away from issues and regions of the world where we should be making a strong and sustained effort to get the job done. Afghanistan and Pakistan, the regional caldron, are prime examples of this unfortunate and costly tendency and the principle of unintended consequences. We succeeded only too well in supporting the mujahideen in Afghanistan after the Soviet invasion of that country in 1979, helping defeat the Soviets in their Afghan adventure and contributing to the demise of the Soviet Union a decade later. We enlisted the support of Pakistan as a key ally in that effort and worked closely with the Pakistani government and military as the conduit of our political and military support to the mujahideen, including the provision of Stinger missiles that caused havoc with Soviet airborne operations.

But once the tide had turned in Afghanistan, we directed our attention elsewhere and virtually outsourced our policy to our Pakistani and Saudi allies, who, in turn, facilitated the rise of the Islamist radicals and the creation of Al Qaeda, led by Osama Bin Laden. The Pakistani military's Inter-Services Intelligence agency (ISI), which has had close ties to the Taliban and also to Islamist groups since the 1970s, and ultraconservative Saudi Wahhabis played their role in these developments. This situation was further exacerbated by the takeover of the Afghan government by the Taliban, who provided safe haven to Al Qaeda, which authored the deadly attacks on our homeland on 9/11. We successfully overthrew the Taliban regime by force after 9/11, but our military action in Iraq in 2003 diverted us from paying close attention to Afghanistan and Pakistan, resulting in the Taliban's resurgence in 2006 and 2007 as a political and paramilitary force to contend with once again, while Osama Bin Laden and his lieutenant Ayman al-Zawahiri still remain at large, most likely somewhere in Waziristan.

A Letter to the Incoming President

One of the most important decisions you could take is to make South Asia a major foreign policy priority, with a sustained focus on Pakistan and Afghanistan. The stakes for regional peace and stability are dangerously high. Pakistan and India are nuclear weapons states with a serious unresolved territorial issue, Kashmir, between them. Since their partition in 1947, Pakistan and India have gone to war three times. A major effort must be made to resolve the Kashmir issue, lest an escalation of this conflict result in a nuclear confrontation on the subcontinent. The struggle for democracy in Pakistan is fragile, as evidenced by the threat of Islamic militancy within the country, the renewed activism of Al Qaeda from the border regions of Afghanistan and Pakistan, the assassination of former prime minister Benazir Bhutto by a suicide bomber in December 2007, and the confrontation between Pakistan's president Pervez Musharraf and the Pakistani lawyers' political movement in support of the rule of law and the judiciary.

The United States should actively encourage Pakistan's moderate political parties and forces, the government, and the professional military leadership (the guardian and guarantor of Pakistan's nuclear weapons) to all work toward forming a democratic coalition that could govern Pakistan and restore political stability made credible by the electoral process. Our key policy objective should be the legitimate transfer of power to elected civilian leaders in Pakistan.

Despite its being the top priority for NATO, Afghanistan continues to struggle against the narcotics warlords, the Taliban, Al Qaeda, and Islamic militants who have come back to the fore and are focusing increasingly on terrorist acts, suicide bombings, improvised explosive devices, and the targeting of schools and teachers. Their goal is to sabotage the state and impose their will on the Afghan people. It is a tense struggle between the advance of state institutions and services in the country under the democratically elected government and the armed resistance of the Afghan extremists. Because the institutions of the state are in a formative phase and are not robust, the extremists are more dangerous than their actual numbers would suggest.

Afghanistan is in a major transitional stage that will require sustained and comprehensive support and commitment from the international community. Security, stabilization, and developmental operations are the key to success or failure. A United States general said, "We aren't losing, but we aren't winning either." He underscored the need for building a national

A Letter to the Incoming President

Afghan army and police force to establish the conditions of security that can enable economic and infrastructure development such as basic services and roads — a top priority for Afghans. He is quoted as saying, “Where roads end, the Taliban begins.”

Mr. President, elections alone do not make democracies. Indeed, they are often exploited to perpetuate dictatorships. Let me share with you an uneasy anecdote that underscores the point. During a meeting with the late Syrian president Hafez al-Asad, I referred to his recent re-election by an astounding vote of 99.44 percent. I then asked him, with tongue in cheek, if he knew who the .56 percent were who did not vote for him. He smiled and quipped, “Ambassador, I have all their names.”

Democracy promotion that focuses on elections without prior institution building and the development of the rule of law, the adoption of the principles of pluralism, and the alternation of power will, more often than not, lead to unwelcome outcomes. Democratization will not necessarily progress in a straight line. A wiser course may well be for the United States to support and encourage erecting the building blocks of democracy from within these societies. It is best to “make haste slowly” toward this long-term goal. The challenge of fostering democratic forms of governance in the Muslim world is great. United States engagement with moderate forces in these societies, including NGOs, political parties, professional associations, and governments, will require much more sophistication and sustained effort than we have demonstrated to date.

We must be clear that there is no room for dialogue with the Islamic radicals such as those of Al Qaeda, whose agenda is to overthrow the governments in the region, destroy Israel, and weaken the moderates and the quest for modernity in the Muslim countries, as well as to weaken “far enemies” such as the United States. We must, however, differentiate between the Islamic radicals and Islamist groups that do not engage in terrorism. Accordingly, you should authorize the secretary of state to have our diplomats contact and engage certain Islamist groups and parties in the Muslim countries, especially those that do not resort to violence, with a view toward determining firsthand what they really represent, what their goals are, what common ground

A Letter to the Incoming President

there may be between us, and whether we can engage them constructively in the attainment of our foreign policy goals and national security interests.

The decision to wage war and commit the nation's blood and treasure is your heaviest responsibility and burden. Except in a case of imminent attack on our homeland and people, that must truly be your last option as commander-in-chief, after all other options have been thoroughly considered and exhausted. Although Colin Powell has told me that no "doctrine" was ever published in his name, despite the many public references to the "Powell Doctrine," the essential elements of his approach bear your careful consideration if you have to lead the country into military conflict. According to Powell's thinking, as you consider your options in times of crisis, including the possibility of the use of military force, your most important task is to have a clear understanding of the political objective you wish to achieve. In short, "What is the mission?" "What are you getting the military ready for?" "What force structure and levels are needed to accomplish the mission?" The failure to put enough "boots on the ground" in Iraq to restore law and order under an occupation caused many of the tragic difficulties we have faced in Iraq since the successful initial military operations. Our forces have had to deal concomitantly with conventional ground combat, counterterrorism, and counterinsurgency missions. On top of those challenges, our military has been largely involved in nation-building operations to help provide the population with basic services, including, as one U.S. general told the Iraq Study Group in Baghdad, "picking up the trash."

It is important not to confuse military objectives with political objectives. Establishing democracy in Iraq is not a military objective, but taking charge of the country and restoring law and order are essential first steps toward political solutions. The distinction between military action and occupation is critical and calls for distinctively different policies and force levels of both military and civilian personnel. Once the mission is decided, "overmatch" your enemy with decisive force and have that decisive force applied to a clear military objective. Another key question you must ask is "How will this war end?" That is more important than defining an "exit strategy." And last, it is inherent in this approach that if military action is going to last for any appreciable amount of time, you must assure domestic political support and, to the maximum extent possible, international support for the war effort. This approach worked in Panama in

A Letter to the Incoming President

1989 and in Desert Storm in 1991. It was not adopted in Iraq in 2003. Indeed, one of your most important priorities may well be to have a major review of United States military policy and doctrine to assure that we are prepared for current and future dangers to our national security.

In an NPR interview in 2007, a United States Army general in Iraq observed that we are “an Army at war, not a nation at war.” He expressed the painful sentiment that “folks [at home] can do more to support the effort.” During a September 2006 visit to Baghdad by the members of the Iraq Study Group, one of the most effective generals we met was Lt. Gen. Peter Chiarelli. In an article in the journal *Military Review*, he wrote, “The U.S. as a Nation — and indeed most of the U.S. Government — has not gone to war since 9/11. Instead, the departments of Defense and State (as much as their modern capabilities allow) and the Central Intelligence Agency are at war while the American people and most of the other institutions of national power have largely gone about their normal business.”

This is an important issue that strikes at the heart of American society and the concept of public service and sacrifice. Senior military officers have told me that they prefer the all-volunteer armed forces because of the professionalism they can achieve within the ranks, without having to train new recruits drafted every two to three years. But we should give consideration to registering Americans for the possibility of a draft if we are faced with a major war that would require an all-out national effort. We should also consider creating a system of national service in civilian government operations and institutions, in lieu of military service. When we started the all-volunteer armed forces in 1970 during the Nixon administration, the U.S. military began to lose a vital link to the country and American society. The historic concept of “the citizen soldier” was weakened. When we go to war we should be “a nation at war,” with the citizenry engaged in various ways and, to the extent possible, from the broadest levels of society, to defend our national security interests at home and abroad.

One of the major stakes in the struggle of ideas in the Muslim world is the geopolitical reality of the vast oil and gas reserves located in the broader Middle East. Destabilization in this region can lead to major global economic disruptions, especially at a time of limited excess oil capacity and growing energy demand, not only from the United States itself but also from the emerging global

A Letter to the Incoming President

powers of China and India. Creating an energy policy for the United States that responds to the urgency of the situation and looks ahead toward balancing supply and demand and the need for conservation and alternative sources of energy is a compelling public policy challenge that you should address as a top priority.

Mr. President, you are the “Voice of America.” Whether addressing national or international issues, yours is the most important single voice influencing attitudes toward the United States abroad. Our country's public diplomacy must have your stamp of approval, enthusiastic support, and long-term commitment. You are the ultimate director of our public diplomacy. Our public diplomacy has lacked strategic direction since the dismantling of the instruments of persuasion we used so effectively during the Cold War. The task now is to reinvent this role in an effective manner within the government. The enhanced definition of public diplomacy should be “to first listen and understand, and then inform, engage, and influence foreign audiences.” This is the *modus operandi* of public diplomacy. Getting this done effectively, with clarity of purpose and vision, should be a key objective of any United States administration. Important organizational changes in public diplomacy structure, resources, programs, and operations have been made in recent years, and your administration can build on them. We often hear the criticism that “it's the policy, stupid; not public diplomacy.” But the reality is that if policy and values constitute, say, 80 percent of how people perceive us for better or worse, then there is an essential 20 percent that constitutes the role of public diplomacy and how effectively we communicate with and inform foreign audiences about our policy goals, values, and who we are as a nation and people. Your public diplomacy team has to be an integral part of the foreign policy formulation process and a key instrument in the actual conduct of the policy.

There is an urgent need to build our professional cadres of civilian, military, and intelligence personnel to be proficient in the languages and the cultures of the Muslim world.

We need to emphasize sustained language training and cultural education programs, so that Foreign Service officers in our State Department will have the requisite fluency in, for example, Arabic, so that they can go on an Arabic satellite TV station such as Al Jazeera and express and debate United States policy effectively.

A Letter to the Incoming President

I outline in these pages a strategic game plan for the direction of America's public diplomacy. Given the criticality of words and images in any struggle of ideas, such as that being waged by the Islamic radicals and extremists, the manner in which the United States conveys our values, interests, and policies in this part of the world is of utmost importance. America's greatness is embodied in the example it has historically set for our own people and the world. Extensive surveys show that majorities in the Muslim world admire and identify with such American values as liberty, freedom of speech and the press, freedom of association, the rule of law, social justice, human rights, women's rights, minority rights, pluralism, equality of opportunity, higher education, science and technology, and market-based economies and the economic prosperity they foster. To the extent that the United States can live up to these ideals we will have the moral power to influence — not decide — world events according to our core principles.

Too often, we are not present to explain the context and content of our national values and policies. As the congressionally mandated advisory group I chaired in 2003 on public diplomacy was told in Morocco, “If you do not define yourself in this part of the world, the extremists will define you.” The United States simply cannot afford such an outcome.

The way forward in meeting the strategic challenge of the struggle of ideas in the Arab and Muslim world is fraught with both danger and opportunity. The human-development deficits in the region and the continuing specter of violence, bloodshed, terrorism, and unresolved conflicts that plague this region have consequences that extend beyond its borders and to our own homeland. This complex situation inevitably requires not only crisis management but, more important and in the long term, resolution of regional conflicts and real progress on the major issues and root causes of political, economic, and social instability that extremists and Islamic radicals exploit for their own political and ideological ends. Given the preeminent position of the United States in today's world, our country can do much, in concert with the international community and the countries of the region, to influence, but not decide or try to transform by ourselves, the future progress of the Arab and Muslim world toward a more peaceful, just, and prosperous future.

A Letter to the Incoming President

The struggle to determine the balance between tradition and the forces of modernity and change in the Muslim world will have to come from within the framework of their own culture and societies. But by formulating and pursuing enlightened policies along the lines discussed in this book, you have a unique and historic opportunity to influence the course of events toward positive ends. This will take strong political will and determination to get the job done. We must learn from the successes and failures of the past and have the humility and courage to recognize where we have gone wrong in order not only to not perpetuate failed policies, but to restore the power and standing of the United States of America in the world as a unique experiment in democracy, liberty, and freedom. The stakes are simply too high to do otherwise.

Respectfully,

Edward P. Djerejian



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MAXIMIZING NASA'S POTENTIAL IN FLIGHT AND ON THE GROUND: RECOMMENDATIONS FOR THE NEXT ADMINISTRATION

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Maximizing NASA's Potential in Flight and on the Ground

THESE PAPERS WERE WRITTEN BY A RESEARCHER (OR RESEARCHERS) WHO PARTICIPATED IN A BAKER INSTITUTE RESEARCH PROJECT. THE RESEARCH AND VIEWS EXPRESSED IN THESE PAPERS ARE THOSE OF THE INDIVIDUAL RESEARCHER(S), AND DO NOT NECESSARILY REPRESENT THE VIEWS OF THE JAMES A. BAKER III INSTITUTE FOR PUBLIC POLICY.

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Maximizing NASA's Potential in Flight and on the Ground

Overview

The new administration presents NASA with a unique opportunity. Instead of trying to close the gap in human spaceflight, and continuing to exhaust critical resources on the current Vision for Space Exploration, NASA should dedicate itself in the first term of the new administration to proving its relevance in the post-Cold War world while restructuring its human spaceflight objectives. We propose a new direction for NASA, a five-point plan that can be carried out with existing capabilities and realistic budgets:

1. Restructure the human space initiative and keep the space shuttle flying until 2015.
2. Deliver short-term (within four years) payoffs in energy and the environment, especially climate change.
3. Deliver longer-term payoffs (within four to eight years) for energy and the environment.
4. Ensure an ongoing and effective robotic space science program.
5. Implement a reinvigorated and effective aeronautical research program, with particular attention to low-carbon fuels and efficiency, to help ensure the future well-being of the nation's aviation industry.

Background

On May 25, 1961, President John F. Kennedy challenged the nation to send a man to the moon and return him safely to Earth by the end of the decade. If accomplished, the feat would clearly establish the United States as the world's technological leader. The Apollo program, which will go down as one of the greatest achievements of all time, was on its way. In little more than seven and a half years, *Apollo 8* orbited the moon and seven months later, *Apollo 11* landed on the lunar surface. The Apollo program captivated the imaginations of literally thousands of young people who went on to become the nation's scientists, mathematicians, and engineers—a brain trust for U.S. industry that fueled American progress for decades.

The United States has continued to maintain a proud record of leadership in space with both manned and unmanned orbital and exploration missions. The successful Viking spacecraft

Maximizing NASA's Potential in Flight and on the Ground

landings on Mars provided the most complete view ever of the planet. Volcanoes, lava plains, immense canyons, cratered areas, wind-formed features, and evidence of surface water were all apparent in the Viking orbital images. The exploration of the “red planet” continued with the *Mars Pathfinder* and *Sojourner*, and the very successful Mars exploration rovers, *Spirit* and *Opportunity*, have continued to provide useful data on the planet almost continuously since 2003; these and other planetary and astronomy missions, such as the Hubble Space Telescope, have completely changed our understanding of the universe in a human life span, and have been equaled by orbital missions that have helped us to better understand Earth and our environment.

The U.S. shuttle transportation system is the longest running, most successful fleet of manned space vehicles ever produced. The International Space Station (ISS), which involves close partnerships with Russia and 16 other nations, is an incredible accomplishment. When completed, it will represent the largest international cooperative technological project in history.

In 2004, President George W. Bush chose to establish a new course for NASA and the civil space program. He announced his Vision for Space Exploration (VSE), a bold plan to complete the ISS and phase out the space shuttle by 2010. Under the VSE, a replacement for the space shuttle was to be designed and built by 2008 and flown by 2014. Humans would return to the moon by 2020 and prepare for missions to Mars. It was made clear that VSE was to be led by the United States.

With President Bush's new vision in mind, NASA quickly reset its priorities. Going to the moon and Mars became the agency's mission. The new priorities pushed science, environmental, and aeronautical research further down the list, and international cooperation was no longer encouraged. Space domination emerged as the administration's space policy, and that agenda did not have a place for cooperative activities in space.

President Bush presented a bold vision, but as several critics pointed out at the time, the vision was incomplete—there was no detailed plan, no provision for the transport of astronauts to space after the shuttle phase-out, no consultation with foreign space partners, and science was no longer a priority.

Maximizing NASA's Potential in Flight and on the Ground

It's been said that vision without funding is a hallucination. No cost estimates were presented for returning humans to the moon and to Mars. The first part of President Bush's vision, as proposed, was to be funded by adding \$1 billion to the NASA budget over five years, and reallocating \$11 billion from within the NASA budget during the same time frame. These amounts were within the annual 5 percent increase the Bush administration planned to add to the NASA base budget (approximately \$15 billion) starting in fiscal year 2005. This budget, however, was very small in comparison to the cost of going to the moon with the Apollo program. The cost of the Apollo program was approximately \$25 billion in 1960 dollars or \$125 billion in 2004 dollars, and the objectives of the NASA Plan are, in many ways, no less challenging. Former senator John Glenn has called the Bush VSE program "one of the biggest unfunded mandates that we have had in all of government history."

Actions initiated as a result of President Bush's new vision have confirmed the lower priority for scientific research, especially efforts to use space to better understand the Earth's environment. They have also seriously damaged international programs such as the ISS. Now that the Europeans and Japanese finally have research modules installed on the station, and can gain a return on their substantial investments, their planned research is in jeopardy. The United States has arbitrarily decided to end support of the space shuttle (with its critical up-and-down mass capability needed by the ISS), and the Europeans and Japanese have been told they will not have access to the new VSE program. The decision to stop flying the space shuttle signaled that the United States is no longer interested in the ISS, and that after 2010 other nations largely will be on their own. Potential international partners will think twice before joining the U.S. in future endeavors. NASA plans to buy trips to the ISS on Russian *Soyuz* and *Progress* (cargo) spacecraft, but with relations between the United States and Russia at a low point, Congress has already questioned the arrangement.

The Bush administration's commitment to shut down the shuttle program by 2010 and purchase future trips to ISS has severely limited the nation's capability to continue to fly Americans into space. The currently planned replacement vehicle cannot be ready much before 2015 and, realistically, probably much later. Progress on developing the new "*Constellation*" space vehicle—an Orion crew exploration vehicle riding on a new *Ares I* rocket—has been delayed due

Maximizing NASA's Potential in Flight and on the Ground

to a number of significant technical design problems. Even if all the problems can be solved with considerably more time and money, the capabilities of the new system fall far short of the shuttle in many ways. For instance, the *Orion* capsule, a larger version of the 1960s *Apollo* capsule, does not allow for extravehicular activity, cannot stay long in orbit, carries no payload up or back, and requires a water landing.

Given budget and manpower shortfalls, NASA is unable to provide firm cost estimates, while tight White House deadlines continue to put pressure on the Ares I and Orion projects. Both are likely to experience substantial schedule slips and growth in costs. The best “advertised” estimate of when the *Constellation* might fly is 2015, though realistically it could be much later. We could be looking at a flight gap as great as eight years or more. And all the while, science and aeronautical research will continue to be held hostage.

It is distressing to observe the current state of the U.S. space program as the nation moves into a new progressive era with the inauguration of President Barack Obama in January 2009.

Despite having brilliantly succeeded in assembling over a million pounds of hardware in the multinational international space station and having endured heartbreaking tragedy and recovery in the space shuttle program, NASA finds itself in an almost impossible situation. The Bush administration's focus on the VSE has resulted in a number of consequences: After 2010, the United States will be dependent on Russia for transport to space and will have to pay for each trip; that, as well as the de-emphasis of science, including research on the ISS, undercuts the investments of our international partners. Additionally, the proposed Constellation system will be over budget, behind schedule, and of limited capability. Finally, the rationale for a total focus on returning to the moon is weak. It has not resulted in a national consensus, nor is there any apparent pressing national concern except, possibly, that China might land on the moon at the end of the decade.

Maximizing NASA's Potential in Flight and on the Ground

Recommendations

In the short term, NASA's deep space human spaceflight efforts can be rapidly redirected from the moon and Mars to focus on technical issues related to energy and the environment by placing greater emphasis on research on Earth and in low Earth orbit, including enhanced satellite Earth observation systems. At the same time, NASA can plan, with international partners, for a truly visionary cooperative space exploration program beyond Earth orbit.

Energy security and threats to the environment—particularly climate change and its impact on the Earth's ecology, land surfaces, oceans, and people across the globe—will be the most significant challenges faced by humankind in the next 50 years and beyond. National and domestic security, foreign policy, the economy, and social equality will be increasingly dependent on our response to these two challenges. NASA has three great resources to make significant contributions in these areas.

First, NASA has a unique capability to operate in air and space, giving it an extraordinary vantage point for observing the Earth's environment. NASA has played this critical role for the nation since the launch of the first Landsat satellite in the 1970s. Unfortunately, NASA has been reluctant to significantly publicize its efforts, in part because of the political controversy surrounding global warming and climate change. This impediment should be removed both by the growing scientific evidence of global climate change, as well as the openness of the new administration to necessary policy actions.

Second, NASA has unique tools for understanding modeling and managing large-scale processes and projects. Tools such as computer modeling, large-scale computing, aircraft, satellites, and communications are required for this work. A strong partnership between NASA, the National Oceanic and Atmospheric Association (NOAA), which has major responsibilities for weather and climate predictions, the U.S. Geological Survey (USGS) and the National Center for Atmospheric Research (NCAR), supported by the National Science Foundation, will be critical to future U.S. capability in weather forecasting and climate projections. But only NASA has the

Maximizing NASA's Potential in Flight and on the Ground

scientific, engineering, and technical capability to design and launch satellites that are needed for Earth observations.

Third, because of its unique mission, NASA has developed extensive engineering experience relevant to alternative energy systems such as wind turbines, solar cell arrays, batteries, and fuel cells. It is also the primary federal agency with the experience to improve the fuel efficiency of all types of aircraft. These capabilities have not been in the public eye but, nevertheless, have been essential to the success of NASA missions since its creation immediately after the launch of Sputnik.

Recommendation 1: Restructure the human space initiative and keep the space shuttle flying until 2015.

This is by far the most challenging element of the five-point plan. One approach to restructuring would be to switch the early focus from the moon and Mars to enhanced support of the international space station. A clearly stated rationale for the ISS, such as continued international cooperation on the peaceful uses of space, scientific research in particular, would be important. Extending space shuttle flights through 2015 would reduce reliance on Russia for transportation to the ISS and provide the large up-and-down mass capability needed by all ISS partners.

The Constellation program would be restructured by canceling *Ares I*. *Ares I*, if successful, doesn't offer much of an advantage over other Earth-to-orbit launchers and its development will take too long and use valuable funds. In addition, canceling other lunar surface-related work—including the lunar lander, the space suit, the rover, and other habitat and surface systems work—would focus the NASA workforce on immediate challenges. These activities can be resumed at an appropriate time in the future.

Canceling human-Mars discussions would be a pragmatic statement that recognizes the incredible challenges of a Mars mission. Robotic missions to Mars should be flown exclusively, at least for the next decade, with extensive surface exploration by rovers.

Maximizing NASA's Potential in Flight and on the Ground

The present Orion program would be restructured to reduce the size of the new spacecraft to a three-member crew, *Apollo*-sized vehicle or an X-38 lifting body vehicle with land-landing capability. The smaller-sized vehicle would be flown on an *Ariane 5* or *Delta IV* launch vehicle, with a planned 2014 or 2015 launch to the ISS. Moving to one of these launch vehicles allows a more rapid deployment by decoupling the new spacecraft from the development of a new launcher such as *Ares I*. Development of the new spacecraft would be accelerated by reducing the crew size and the need for weight efficiency, and taking advantage of previous Apollo and/or X-38 development. This significantly reduces the technical risk in many key areas, such as thermal protection and parachutes. Weight and technical risk can be further reduced by designing the service module for ISS service missions, making it simpler.

Europe and Japan should be invited to participate as Europe participated in the X-38 program. Parts would be provided in return for services (i.e., future launches to ISS). In order to ensure this international participation is meaningful and effective, the recommendations stated in the recent National Research Council report, "Beyond Fortress America," should be implemented. This report provides an excellent assessment of the impact of building walls that compromise our ability to access global science and technology and that adversely affect our ability to compete globally. The report makes recommendations to reform the export control process, ensure scientific and technological competitiveness, and improve the nonimmigrant visa system that regulates entry into the United States of foreign science and engineering students, scholars, and professionals. It calls for immediate action "to stem a serious decline affecting broad areas of the nation's security and economy."

By not investing in a unique *Ares I* Earth-to-orbit human launcher, NASA will be positioned to take full advantage of emerging commercial Earth-to-orbit transportation services should they develop in the 2015-2020 timeframe.

In our restructuring approach, the shift in near-term focus from lunar to ISS would be followed by building a capability for deep space asteroid or comet intercept as a longer-term focus based on an *Ares V* heavy lift vehicle. The *Ares V* heavy lift launch capability is critical to any further deep space exploration. By canceling *Ares I*, it should be possible to focus all of the agency's

Maximizing NASA's Potential in Flight and on the Ground

launch vehicle development capability on designing the one launcher needed by the nation for future deep space work, and the one launcher not anticipated to be provided by the private sector. All options for providing an *Ares V* heavyweight launch capability will be studied, including liquid boosters, liquid fly-back boosters, and international cooperative options. This should include the evaluation of options such as proposed by the Direct Launcher concept that makes use of most of the existing shuttle hardware, including the two solid rocket boosters and the external fuel tank. The only key modifications would be an *Apollo*-like capsule at the top and an engine at the bottom of the external fuel tank. Although *Ares* also uses shuttle parts, it is essentially an entirely new rocket.

The ability to fly to an asteroid would give the United States a lunar capability should one be needed in the future. A deep space mission, such as a human asteroid or comet intercept, would effectively demonstrate American leadership in space, should that be a concern in the face of a possible Chinese landing on the moon. It might even be argued that an American lunar return would do less to question U.S. space leadership than a more aggressive goal of performing a human asteroid intercept mission.

To advance this and other concepts, a joint NASA-DOD propulsion research program should be initiated, as propulsion is a limiting factor in space exploration. An aggressive program focused on innovative advanced propulsion development has been needed for a long time.

A restructured human spaceflight initiative should be premised on the idea that any future plans by the United States to return women and men to the moon, and someday to Mars, will need to be top national priority. It should involve many U.S. federal agencies, universities, and industries, and be fully international in scope. By restructuring the human spaceflight initiative, resources will be made available to allow NASA to contribute to other vital short- and long-term national priorities.

Maximizing NASA's Potential in Flight and on the Ground

Recommendation 2: Deliver short-term (within four years) payoffs in energy and the environment, especially in the area of climate change.

This recommendation takes advantage of the unique capabilities and skilled workforce of each NASA center. The efforts of the various centers would be refocused and assigned responsibilities commensurate with their expertise. The short-term payoffs would involve initiatives to fully understand and optimize the aerodynamics, structures, and mechanisms of large-scale wind turbines; to fully understand and optimize high-efficiency, large-scale solar cells and small-scale fuel cell technology applications; to improve aerodynamic and propulsion efficiency of general aviation and commercial aircraft; and develop and evaluate alternative aviation fuels and aircraft power plants.

Initiatives would be implemented to fully employ NASA's ability to monitor, model, and predict long-term climate, utilizing NASA instruments, aircraft, spacecraft, computers, and communications. This effort could include enhanced use of the ISS for monitoring the Earth and expanding the current Earth Observing System (EOS), and would require close coordination with the NOAA, USGS, and the National Center for Atmospheric Research, supported by National Science Foundation.

In addition, robotic exploration would be implemented to compare the Earth to sister planets. This could lead to a better understanding of Earth planetary science.

Breakthroughs in all of these areas, as well as the development of better solar and fuel cells and improved knowledge of the environment and planetology, are essential to future exploration activities.

Recommendation 3: Deliver longer-term payoffs (within four to eight years) for energy and the environment.

As a potential long-term energy solution, an effort would be made to demonstrate—initially on a small scale—wireless power transmission from orbit to the Earth using the shuttle and the ISS. Full implementation of a space-based solar power system requires a larger and less costly launch infrastructure than is currently available. It isn't feasible until launch costs can be reduced.

Maximizing NASA's Potential in Flight and on the Ground

However, a low Earth orbit demonstration, potentially based on the shuttle or the ISS, would allow us to understand the problems and required efficiencies. This concept has made major strides since its initial inception with the realization that constellations of smaller, more efficient solar collectors in medium Earth orbit can provide the same capability as larger, high orbit satellites. Demonstrating space-based solar power on a small scale would help us better understand what would need to be done to utilize this concept for supplying electrical power needs. Additional small-scale efforts would be initiated to demonstrate other potential technologies for healing the planet that are tied to NASA's ability to monitor, model, and engineer large-scale complex systems

This recommendation would again utilize the unique capabilities of the appropriate NASA centers.

Recommendation 4: Ensure an ongoing and effective robotic space science program.

NASA's ongoing and effective robotic space science program would be expanded, with special emphasis given to university research, and should be based on strong and active international cooperation. Working with the nation's universities and drawing on their knowledge and expertise, NASA should provide support for a large, strong, and effective graduate student program. The National Defense Education Act, originally instituted in 1958, served the nation well in the past. The Act's intent was to ensure the nation's security by developing the mental resources and technical skills of its young men and women. Key features of the legislation included a student loan program to colleges and universities to increase the flow of students into science, mathematics, and foreign language careers; a "National Defense Fellowship" for graduate study toward a college teaching career; and a wide array of programs to enhance pre-college teacher training and public understanding of science and technology. Combined with an active and meaningful partnership between NASA and the nation's universities, it could help to address the potential shortage of young U.S. scientists and engineers.

Maximizing NASA's Potential in Flight and on the Ground

Recommendation 5: Implement a reinvigorated and effective aeronautical research program, with particular attention to low-carbon fuels and efficiency, to help ensure the future well-being of the nation's aviation industry.

Aeronautical capabilities are important to the U.S. economy, but the aeronautics segment is becoming less competitive. The U.S. share of the world aerospace markets has declined significantly since the mid-1980s. In the past, the NASA aeronautics research and technology program has produced significant advancements in aeronautical design. The low-drag cowl for radial engines and the “Coke-bottle” to reduce transonic drag rise are excellent examples of the benefits gained from NASA's aeronautical research program.

More recent aeronautics advancements such as multi-axis thrust vectoring exhaust nozzles integrated with aircraft flight-control systems; fly-by-wire flight control technologies; high-strength, high-stiffness fiber composite structures; and tilt-wing rotorcraft technology have been achieved in partnership with NASA's research and technology programs. Modern aircraft are complex “systems of systems,” and advances in one discipline, such as aerodynamics, may require an advance in another discipline, such as structures, before they can be applied in a new aircraft design. A NASA fundamental aeronautical research and technology program, not tied to specific development projects, would be an essential element of the reinvigorated aeronautics initiative and would provide the foundation for such future advancements.

Government aeronautical test facilities are another area of concern. Many facilities have been or are being closed down. U.S. aircraft companies are going overseas to perform wind tunnel testing of new U.S. designs. A reinvigorated and more effective aeronautical research program must include a review of the present status of the nation's aeronautical test facilities and the identification of the upgrades and new construction needed to ensure the support of the revitalized aeronautical research program.

Conclusion

Since its inception in 1958, NASA has compiled a record of outstanding achievements, both in space and in aeronautics. It has taken men to the moon and returned them safely to Earth. It has advanced our understanding of our planet and the universe, and its technological advancements have benefited life on Earth for all mankind. As Dr. Michael DeBakey has said, “hospital operating rooms and modern health monitoring and care would not be what it is today were it not for NASA technology.”

NASA has set the standard for international cooperation and developed the most successful manned space vehicle ever built, the space shuttle. And yet, as it successfully completes the largest international cooperative technological project in history, the international space station, NASA's Vision for Space Exploration leaves the nation with no capability to continue to fly humans in space for a significant period of time. The new vision basically focuses the agency on a single mission, moving NASA away from a balanced set of activities—to the detriment of science, engineering, research and technology, and aeronautics—that have contributed so much to the nation's leadership in space and aeronautics.

The proposed five-point plan takes the agency in a direction that will significantly contribute to the future of the United States and the American people, indeed to all humankind, in two vital areas: energy and the environment, especially climate change. Under the plan, NASA will continue to fly humans in space, complete the international space station, meet its commitments to our international partners, and re-establish a balanced set of activities featuring science, engineering, aeronautics, research, and technology. It will build a foundation for a human exploration program that involves other agencies, the nation's universities, and is based on international cooperation.

A key stated objective of all NASA research and technology programs will be to excite a new generation of scientists and engineers and rebuild scientific and technical expertise within NASA and across the nation—a critical need highlighted in the National Academies report, “Rising Above the Gathering Storm.” This 2005 report, prepared in response to a request from Congress,

Maximizing NASA's Potential in Flight and on the Ground

identified and recommended strategies for implementing ten actions that could enhance science and technology enterprise and allow the United States to successfully compete, prosper, and be secure in the global community in the twenty-first century. NASA's research center structure would be re-established with this objective in mind, creating a strong link to the nation's universities. As a part of this restructuring, greater authority and responsibility would be returned to the center directors. The full cost accounting constraints that require projects to pay for personnel, and for all personnel to be paid by projects, would be removed. Personnel would be funded from a common pool as they were during NASA's entire history, prior to recent times. Full cost accounting requires each engineer or scientist to be supported by a program and does not allow for an organization of engineers and scientists devoted to research and development, a constraint that all but eliminates the agency's ability to build and retain its technical and scientific expertise.

A new and unique window of opportunity is available to re-establish NASA as an exciting and innovative organization that is both immediately relevant and can contribute solutions to the nation's most pressing needs while continuing our scientific quest and our human desire to explore the frontiers. We offer an approach to resetting priorities for the U.S. space program and restructuring NASA that we believe would accomplish these goals. And we believe that the benefits of this approach to the nation are great. Whether or not our proposal is heeded, the status quo is not an acceptable option.



JAMES A. BAKER III INSTITUTE FOR PUBLIC POLICY
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U.S.-RUSSIA RELATIONS: RECOMMENDATIONS FOR THE NEXT ADMINISTRATION

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Overview

Russia may no longer be a superpower, but its vast size alone—the country stretches across eight times zones—makes it a regional actor in European, Central Asian, and Far Eastern affairs. It is also one of the world's most important energy producers. Russia's petroleum exports are second only to Saudi Arabia. It is the leading supplier of natural gas to global markets, notably Europe. At the same time, Russia still boasts a nuclear arsenal in excess of 5,000 strategic and tactical warheads. Not least, Russia is positioned—in international forums like the United Nations Security Council and in countries around its periphery—to cause mischief to U.S. interests and initiatives.

Relations between Washington and Moscow have fallen to their post-Cold War nadir in the wake of the Russo-Georgian war of August 2008. Your administration will not find dealing with Moscow easy. Our interests diverge, sometimes sharply, on a number of key issues. But you can—and should—take steps to halt the deterioration in relations and identify areas of common interest. We recommend that you:

1. Put U.S.–Russian relations on a businesslike footing
2. Reduce public criticism of the Russian regime
3. Go slow with NATO expansion
4. Reassess Eastern European missile defense
5. Offer Russia NATO membership
6. Begin a new round of nuclear arms reductions talks
7. Neutralize Russian obstruction over Iran by directly engaging Tehran in talks
8. Support European efforts to diversify its natural gas supply
9. Encourage Russian hydrocarbon production

Background

Russia holds an anomalous position in the global system. It is not a status quo power, like the United States and its allies in Western Europe and East Asia, with a direct stake in existing formal and informal international arrangements. It is not an emerging power, like China or India, with populations and growth rates that guarantee them an ever more important role in world affairs. Nor is it a “rogue state,” like Iran or North Korea, largely isolated from the international system. Russia is, in many ways, *sui generis*.

While it has recovered from the economic collapse and political chaos of the 1990s, Russia remains a shadow of the old Soviet Union. It has lost its empire in Eastern Europe, the Caucasus, and Central Asia. It no longer constitutes a major conventional military threat to NATO. Moscow cannot count, as it once did, on the unqualified support of an array of client states in Central America, Africa, and the Middle East. And, with the collapse of communism, it no longer represents a viable ideological alternative to democratic capitalism. In broad historic terms, Russia remains a power in relative decline.

Still, it would be a mistake to discount Russia. This was brought home with a vengeance by the Russo-Georgian war of August 2008. Though of short duration (five days) and modest geographic scope—fighting was largely limited to the breakaway Georgian region of South Ossetia and areas contiguous to it—the international impact of the conflict was dramatic.

The Russo-Georgian dispute is only one of a long list of differences between Washington and Moscow. Many center on U.S. policy in former Warsaw Pact countries and the newly independent states of the Caucasus and Central Asia. (Russia refers to the latter as its “Near Abroad.”) Moscow continues to object to NATO expansion to countries like Ukraine and Georgia. It is no less vociferous in its opposition to our plans to deploy a missile defense system in the Czech Republic and Poland. It is tolerant, but only that, of Washington’s attempts to expand military cooperation with other states in Central Asia. And it remains concerned by U.S. support for oil and gas pipeline routes in the regions that bypass Russia. (Washington extended

extensive diplomatic and financial support to the Baku–Tbilisi–Ceyhan petroleum pipeline that went into operation in 2005.)

Moscow has been unsurprisingly dismissive of Washington’s criticism of its human rights policies. The Russian government has been blunt in pointing out what it calls the hypocrisy of the Bush administration—with its record of rendition, torture, and detention without charge—in presuming to lecture anyone on human rights. In the broader international arena, Moscow has played a largely obstructionist role in U.S.-led efforts, at the United Nations and elsewhere, to compel Iran’s cessation of its nuclear weapons program. And anti-American rhetoric is increasingly a staple of Russian government pronouncements.

How did U.S.-Russian relations come to this point? In June 2001, President George W. Bush famously looked into Russian President Vladimir Putin’s soul and saw a statesman with whom he could work. A year later, Washington and Moscow signed the Strategic Offensive Reductions Treaty, which dramatically cut the number of strategic weapons deployed by each side. In 2002–2003, Russia, unlike traditional U.S. allies France and Germany, remained largely immune from Bush administration criticism for its opposition to the U.S. invasion of Iraq.

Why the change? On one level, the answer is easy: energy prices.

Both petroleum and natural gas prices rose five-fold between early 2002 and their 2008 peaks. This led to a giant financial windfall for Russia, which depends heavily upon energy exports for both economic growth and government revenue. High hydrocarbon prices have permitted President (and later Prime Minister) Putin to consolidate his political position at home and bolster Russia’s status abroad. A brief cut-off of gas supplies to Ukraine in 2006 raised concerns in European capitals and Washington that Moscow stood prepared to use energy as a blunt instrument of its foreign policy.

But more than rising energy prices have played into deteriorating U.S.-Russian relations. The seeds of the current situation date back to the end of the Cold War and collapse of the Soviet Union. Washington welcomed Moscow’s new democratic government, offering both (fulsome)

diplomatic and (modest) economic support for President Boris Yeltsin. But Washington also moved, beginning under President George H.W. Bush and continuing under presidents Bill Clinton and George W. Bush, to expand NATO into Eastern Europe. At the same time, Washington increased its diplomatic, economic and, in some cases, military presence in the Caucasus and Central Asia. We did so for any number of reasons: to hedge against the possible return of Russian expansionism; to consolidate the political and economic transformation of former Warsaw Pact countries like the Czech Republic and Poland; to bolster the sovereignty of fledgling states in Russia's "Near Abroad"; and, at least in part, to appease domestic constituencies, notably Americans of Eastern European descent.

Whatever Washington's motives—and they assuredly have been mixed and at times contradictory—the fact remains that the United States has pushed our sphere of influence right up the borders of Russia. It is hard to imagine any Russian regime, whether democratic or authoritarian, gracefully acceding to this state of affairs. But Russia—plunged into economic crisis and political chaos for much of the 1990s—was in no position to do much more than complain. With the ascendance of Vladimir Putin in 1999 and the rise in energy prices, that changed.

Nor should we forget Russian history. Complex attitudes toward the West long predate Putin's rise. They reach, in fact, back to the emergence of modern Russia in the seventeenth century. The West has prompted both admiration and fear over the course of the country's history. Both reactions are understandable. Russia has lagged behind Western Europe in economic development for hundreds of years. And it has routinely felt victimized by European powers: Sweden in the eighteenth century, France and Britain during the Crimean War, Germany during World Wars I and II. We need not overdraw the case. But there is no doubt that Russia has historically been the scene of conflict between those who look to the West with optimism and those who view it with suspicion. However the conflict is cast—as Westerners vs. Easterners, as liberals vs. nationalists, as internationalists vs. imperialists—Russia remains a country with highly ambiguous views of the West in general and the United States in particular.

The election of Putin's hand-picked successor, Dimitry Medvedev, as president has left now-Prime Minister Putin still very much in control of the apparatus of government; he might well run for the presidency again when Medvedev's term expires in 2012 (or earlier, should Medvedev, perhaps at Putin's behest, resign). But there may be storm clouds ahead for Putin and for Russia.

The recent decline in energy prices, if sustained, will deal a heavy blow to Russian economic growth and its government's fiscal position. Moreover, the world financial crisis has wreaked havoc in Russian markets and increased pressure on the ruble as investors flee to less risky currencies, notably the dollar. The Russian government has built up hard currency reserves of over \$500 billion against such an emergency to avoid a repetition of the collapse of the ruble in 1998. But whether half a trillion dollars will be sufficient is doubtful. Any last-ditch defense of the ruble will almost certainly require interest rates so high as to cripple domestic investment and, therefore, Russian growth.

On its face, such a situation would suggest a weakening of Putin's position at home and Russian assertiveness abroad. But it might have the contrary effect. Faced with an economic emergency, Putin could seize the opportunity to further broaden the scope of his domestic powers. There is evidence, for instance, that the Russian government may be using the current crisis to expand its role in the country's mining and industrial sectors. More dangerously from our point of view, Putin might resort to foreign saber rattling to rally flagging support among economically hard-pressed Russians. It is important to recall that Russian weakness does not necessarily translate into stronger neighbors along its borders. They, too, will be hurt by the global economic slowdown. The oil exporters among them—notably Azerbaijan and Kazakhstan—must face declining petroleum prices without Russia's huge foreign currency reserves. At a minimum, you should not assume that Moscow's economic woes will reduce the imperative of crafting an effective policy towards Russia.

Recommendations

1. **Put U.S-Russian relations on a businesslike footing.** Under the outgoing Bush administration, U.S. policy toward Russia has seemed sometimes to suffer from bipolar disorder, careening from breathless optimism to angry disenchantment. Putin is a hard-nosed realist. You will need to be a hard-nosed realist in dealing with him. But that does not mean we should forgo opportunities for common action where U.S. and Russian interests converge. Combating terrorism is clearly one of them. So is avoiding a Taliban victory in Afghanistan. Creating a high-level dialogue with Putin and President Medvedev is an important first step. A critical element of any dialogue is listening. And, at least when it comes to Russia, the Bush administration has often seemed deaf. Moscow made very clear, for instance, that it would consider Kosovar independence a definitive precedent for the Georgian regions of South Ossetia and Abkhazia. Perhaps this should not have dissuaded us from recognizing Kosovo. But Washington should not have been surprised at heightened tensions between Moscow and Tbilisi, nor Russian recognition of South Ossetia and Abkhazia.
2. **Reduce public criticism of the Russian regime.** There is admittedly much to deplore in Putin's Russia: the erosion of freedom of the press and other liberties, the lack of a viable political opposition, the reassertion of direct and indirect government control of major parts of the economy; and centralization of authority in one individual. Russia may be far from the totalitarian state of the Soviet era, but it comes nowhere close to a liberal democracy. However, constant criticism by Washington is at best, ineffective, and, at worst, counterproductive. For the moment, Putin's regime remains immensely popular among Russians. More U.S. criticism may only play into his hands. It is not hard to imagine Putin whipping up nationalist sentiment at a time when an economic downturn is undermining his domestic legitimacy. This does not mean that human rights and rule of law need disappear from the U.S.-Russian bilateral agenda. But public criticism should be minimized. At the very least, prompt movement to reverse Bush administration policies in such areas as torture and detention without trial will make our criticisms, even if muted, carry much more weight.

3. **Go slow with NATO expansion.** The Russo-Georgian war illustrates the huge risks of over-hasty expansion of NATO. Moscow's actions may have been both illegal and disproportionate. But the proximate cause of the bloodshed was Georgian president Mikheil Saakashvili's impetuous attempt to seize South Ossetia. Some argue that NATO membership would prevent Russian military action against Georgia in the future. Perhaps. But it might well prompt even more reckless action by the Georgian government in an attempt to secure NATO military support in its efforts to re-occupy South Ossetia and Abkhazia. Article 5 of the North Atlantic Treaty—which declares that an attack on one member country will be considered an attack on all—is a solemn pledge of mutual defense. To extend that pledge to Georgia at the current time means that you should be prepared to dispatch American combat troops if the Russo-Georgian dispute descended again into violence. Needless to say, this is not an appealing prospect, even if our military were not already heavily committed in Iraq and Afghanistan.

As president, you simply cannot allow the “tail to wag the dog” in places like Georgia and Ukraine. While humanitarian support for Georgia is appropriate, prudence demands that we carefully assess the risks and benefits of supporting early NATO membership. Other NATO members, especially Germany, are very wary of being drawn into the Russo-Georgian conflict. The NATO ministerial meeting of early December 2008 called for further cooperation with Georgia and Ukraine but stopped short of endorsing fast-track membership for either. It is a sensible compromise. The Roman injunction *festina lente* (“make haste slowly”) should be the motto of your administration's approach to expanding NATO.

4. **Reassess Eastern European missile defense.** The Bush administration's public rationale for providing missile defense to Eastern Europe—to protect Europe from a strike from Iran or North Korea—is disingenuous on its face. North Korea does not have a missile that can reach Europe. Iran does not have nuclear weapons; it is, moreover, unclear if and when Tehran will acquire them. While Iran has an established missile program, actually developing a deliverable nuclear warhead is an additional and daunting challenge. Even assuming that the purpose of the shield is to protect against Russian attack, deployment

still makes no sense. If, for whatever far-fetched reason, Moscow did want to launch a nuclear strike on Eastern Europe, it possesses enough missiles to overwhelm any shield. Eastern European missile defense, in short, is a solution in search of a problem. It provides false security to the Eastern Europeans; it unnecessarily irritates the Russians. Given existing U.S. commitments to Poland and the Czech Republic, it may prove impossible to abandon deployment of the shield in the short term. But any expansion should be deferred and removal should be considered as a bargaining chip in any new strategic talks with Moscow.

5. **Offer Russia NATO membership.** The idea of offering Moscow NATO membership is not new. It has been proposed by various observers, off and on, since the collapse of the Soviet Union. But it has never gained traction. And it has lost most of whatever appeal it may have had in the wake of Russia's more assertive foreign policy in the 2000s. But you should give it serious consideration. What purpose would an offer of membership serve? Today, Russia does not meet any number of formal and informal criteria for NATO membership. Its behavior falls far short in such areas as human rights, rule of law, and respect for international borders. Moreover, Putin's government would almost certainly reject any conditional offer. But outlining a path for eventual NATO membership would serve two important purposes. In the short term, it would help to shift the terms of debate on NATO expansion away from containing Russia and towards Eurasian collective security. In the longer term, it would create a plausible path by which a post-Putin regime could more closely integrate itself with the West on terms of equality.
6. **Begin a new round of nuclear arms reductions talks.** The Strategic Arms Reduction Treaty (START) expires in 2009. This provides an occasion for negotiations aimed at further reductions in U.S. and Russian arsenals. The sheer size of those arsenals—each capable of destroying much of the world—defies reason. Talks with Moscow could mark a first step toward an effort to reduce nuclear weapons worldwide. Whether this effort should include a formal endorsement of the zero nuclear weapons proposal of former Georgia Senator Sam Nunn, former Defense Secretary William Perry, and former Secretary of State Henry Kissinger is, perhaps, debatable. But there is no doubt that the

number of nuclear weapons worldwide exceeds any plausible strategic justification. A successor to START is a first and critical step in reducing their numbers.

7. **Neutralize Russian obstruction over Iran by directly engaging Tehran in talks.** You have already indicated your willingness to expand the scope of direct negotiations with Iran on its nuclear program and other issues of concern to the United States. Whether such talks will lead to greater transparency in Tehran's nuclear program is unclear; even less clear is whether negotiations could ultimately lead to a "grand bargain," under which full U.S. recognition of Tehran would be traded for Iranian concessions in its nuclear program and in its support for radical groups such as Hizbollah and Hamas. At a minimum, a good faith U.S. offer to negotiate without precondition places Tehran and, by extension, Moscow on the diplomatic defensive. At best, progress in U.S.-Iranian talks could render Russian obstruction at the United Nations moot.

Interestingly, improved relations with Tehran could include an end to U.S. opposition to oil and gas pipelines from Central Asia to the Persian Gulf through Iran. Such routes would lessen the dependence of Central Asian countries on Russia for transportation of their hydrocarbons. We should recall that Russia and Iran are energy competitors—both in terms of production and as potential pipeline routes. The current Moscow-Tehran entente is an artifact based on common opposition to Washington's policies. It should not be construed as permanent. Indeed, improved U.S.-Iranian relations would seriously undermine it.

8. **Support European efforts to diversify its natural gas supply.** Russia's four-day cutoff of gas to Ukraine in 2006 sent shock waves throughout Europe, which remains heavily dependent on Russian gas for electrical power generation. Whatever its reasons—and they are more complex than much of the Western news coverage suggested—the suspension has backfired. European countries, East and West, are seeking to diversify their sources of supply. Should natural gas enter a sustained period of depressed prices, Russia's leverage could further decline. Given the broader economic problems likely to beset Russia, Moscow will be less prone to ruffle its commercial relations with

dependable customers, especially Germany. True, Russia can inflict significant damage on European economies. But it can only do so by damaging its own. Energy dependence on Russia is essentially a European problem. And Europeans are the best judges of the risks associated with it. We should, however, be prepared to offer diplomatic—and in the case of the Eastern Europeans, financial—support for ongoing efforts at diversification.

9. **Encourage Russian hydrocarbon production.** The current economic downturn and decline in oil and gas prices make investment in future Russian production unattractive. But in the long term, increased Russian oil—and, we should not forget, natural gas—production will be critical in meeting world energy demand. Whatever the duration of the current global recession, economic growth will eventually return and, with it, rising demand for oil and gas. This is particularly true of China, where petroleum imports will rise as automobile use expands. Ironically, the current downturn may brighten the prospects for U.S. private involvement in Russia's hydrocarbon sector. Moscow has long been resistant to production-sharing agreements, under which foreign investors receive a share of production as payment. This opposition may ease in an environment of lower prices and higher borrowing costs.

Should the U.S. government encourage increased natural gas and, especially, oil production? You are committed to addressing global climate change. And a key element of reducing greenhouse gas emissions is increasing the cost of hydrocarbons to consumers. But it is surely better to do so by a carbon tax or cap-and-trade system than by allowing oil and gas prices to rise again because of inadequate production. In the former instance, windfall profits will accrue to the U.S. government to be returned to consumers through tax rebates or invested in clean technologies; in the latter, those windfalls accrue to energy producers. In short, increased hydrocarbon production—in Russia and elsewhere—is consistent with efforts to reduce greenhouse gas emissions.

Conclusion

You assume the presidency at a time of extraordinary international challenges.

Your administration must move quickly to coordinate a response to the most severe global financial crisis since the Great Depression and a world recession of unknown severity, scope, and duration. Two costly wars—in Iraq and Afghanistan—will demand immediate attention. In the wake of November’s terrorist attack in Mumbai, averting Indo-Pakistani conflict has moved to the top of the U.S. foreign policy agenda. Addressing the nuclear ambitions of North Korea and, especially, Iran is simply too urgent to defer, even for a few months. And the Arab–Israeli dispute—that graveyard of failed American diplomatic initiatives—continues to simmer.

These, it must be stressed, are merely the most immediate of the major foreign policy challenges confronting your administration. Others include sustaining multilateral efforts to combat terrorism, rebuilding frayed ties to traditional American allies, engaging an ever more assertive China on a range of bilateral and regional issues, reviving moribund talks on trade and investment, and, not least, coordinating a global response to climate change at a time when most countries will be focused on short-term economic recovery rather than the long-term effects of rising atmospheric temperatures.

Then, of course, there will be the inevitable surprises. When asked what represented the greatest challenge confronting a statesman, British Prime Minister Harold MacMillan memorably replied: “Events, my dear boy, events.” As president, you too will be faced by “events.” It is all too easy to imagine them: a major terrorist attack against the United States or its allies; another round of U.S.–Chinese tensions over Taiwan; or severe political instability in countries like Egypt, Saudi Arabia, or Pakistan.

The last thing your administration will want to do is expend time and political capital on managing U.S.–Russian relations.

But you will have no choice.



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INFORMATION TECHNOLOGY POLICY: RECOMMENDATIONS FOR THE NEXT ADMINISTRATION

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Information Technology Policy

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Overview

This paper advocates that the next U.S. administration place a renewed emphasis on information technology (IT). It has been more than a decade since speculation about “information superhighways” and “bridges to the twenty-first century” dominated the political terrain. We should now form pragmatic policy regarding IT development and application.

- **Recommendation 1:** Appoint a federal Chief Technology Officer (CTO) as a steward for private investment, public-private partnership building, and application in government. While a CTO will likely oversee many areas, IT will remain a primary focus. The United States must remain a global leader in IT if its standing in the community of nations is to be assured.
- **Recommendation 2:** Repair the nation’s cyber-infrastructure. An economic stimulus measure directed at the nation’s crumbling bridges and roads should similarly address the links and nodes of America’s cyber-infrastructure.

Under the general categories of private, public–private, and government (public) initiatives, the following ten items could produce economic benefit, enhance societal and national security, and improve the way the federal government functions. These categories are meant as a starting point and are neither comprehensive nor mutually exclusive.

- **Recommendation 3:** Private sector initiatives
 - 3.1: Build new pieces of telecommunications infrastructure that focus on wired and wireless broadband technologies.
 - 3.2: Invest in energy-efficient, sustainable green IT designed to mitigate IT’s carbon footprint.
 - 3.3: Develop computing technologies, both hardware and software, to assure the survival of Moore’s Law for another generation.
- **Recommendation 4:** Public–private initiatives
 - 4.1: Form partnerships to implement IT in health care, focusing on the implementation of electronic health records.

- 4.2: Develop industry and regional communities that can help secure public and private cyber-infrastructure.
- 4.3: Partner industry and academia to inject rigor, resources, and opportunity into the public school system in order to train a new generation of computer engineers.
- **Recommendation 5:** Government IT initiatives
 - 5.1: Create a new U.S. Department of State entity to engage in digital public diplomacy.
 - 5.2: Overhaul the federal IT workforce by recruiting and training a cadre of technical managers capable of working with industry to design and implement programs on time and within budget.
 - 5.3: Construct new interactive Web 2.0 information communities, modeled on Intellipedia, that are managed by government but incorporate information from outside sources as well.
 - 5.4: Enunciate a clear national policy on monitoring the Internet and digital networks to provide actionable intelligence and construct a safer digital society.

Background

The United States has been a dominant force in IT and telecommunications since Samuel Morse patented the electrical telegraph in the 1830s. In subsequent decades, a succession of American companies—including Western Union, AT&T, IBM, Microsoft, and Google—have led the field, producing innovative technologies that have benefited shareholders and the U.S. economy alike. Today, U.S. firms—Google, Microsoft, Oracle, Cisco, and Hewlett Packard among others—still hold the high ground in global IT. The question is, for how long?

With the U.S. in the most serious financial crisis since the Great Depression, how might the government intervene to spur technological development and economic activity? An answer may be found in the spirit of the Communications Act of 1934 which, among other things, turned the concept of universal service into law by helping to make phone service widely available.

At the dawn of the twentieth century, pundits argued whether every American household or business needed a telephone. A century later, the folly of any argument against telephone

connectivity is clear. The same might be said for connection to the dominant network of our day: the Internet. In hindsight, the Communications Act can be viewed as a stimulus for the telephone industry, which saw its customer base shrink drastically as a result of the Great Depression. Government intervention on behalf of the IT industry during the current economic crisis could be similarly beneficial. A move to make the Internet universally available could spur technological advances and reinvigorate the economy.

We urge the United States to firmly re-establish itself as the global leader in IT, largely by the same set of drivers that got it there in the first place. Initiatives for innovation, development, and adoption of IT are divided into three general categories:

1. **Private** initiatives, in which government serves as venture capitalist and stimulation vehicle for activity that would not otherwise take place under market conditions.
2. **Public-private** action, where industry and government partner to work on problems that neither is capable of solving independently.
3. **Public** initiatives, or actions taken by government to adopt IT to improve or revolutionize its business processes, from human resources to intelligence collaboration.

Recommendations

Recommendation 1: Federal Chief Technology Officer (CTO)

Since the appointment of a federal Chief Technology Officer (CTO) is a likely objective of the next administration, we advocate that the Office of the CTO be subdivided into three operational areas: (1) a venture development firm; (2) a government to non-government liaison; and (3) a technology review body for government. While both the Clinton and Bush administrations opted against the creation of a federal Chief Information Officer (CIO), the current economic crisis has led to an atmosphere more open to the possibility of new governing bodies.

Guideposts for the role of a CTO in industry are few, however. The federal CTO should have the funds, mandate, and administrative capacity to develop new initiatives in IT and beyond, from nanotechnology and stem cells to open-source software and a next-generation Internet. The CTO should also have the authority to tap expertise from government and industry to solve problems,

such as cybersecurity or broadband penetration, and overhaul the information-management component of government. Finally, the federal CTO should address the glaring need for an overhaul in the education of our future workforce, whose mastery of science and math—the foundation disciplines for careers in IT—is very poor.

Recommendation 2: Government as a Venture Capitalist

With the American taxpayer now a stakeholder in the investment-banking sector, it makes considerable sense to find ways to make similar investments in technology. Naturally, without a clear concept or business model, the federal government does not wish to replicate the hyperbolic investments made during the dot-com era. That said, we must recognize that while the United States hedged its stake in the information revolution, most international competitors redoubled theirs.

The quick launch of a federal technology venture capital operation will permit the sort of innovation needed to regain ground in the global competition for leadership in IT. Countries that surged forward in the past decade were aided by collaborations between industry and government. In India and China, there is private and public investment in university computing and telecommunications programs. Morse, Edison, Gates, or Brin may opt for Bangalore or Shanghai over Silicon Valley as the venue for his or her firm. This would have significant geopolitical consequences for the United States.

Recommendation 3: Investments in the Private Sector

3.1: Universal Service – Final Mile Fiber, Wireless, and Municipal Connectivity

While local government initiatives to provide wireless Internet service at low or no cost have largely foundered, there is a clear need to construct high-bandwidth connections for more households and businesses in the United States. The problem for even the largest telecommunications players is the timetable necessary to recoup investment. Laying fiber-optic cable is very expensive. But if America is to have a world-class information infrastructure, it will require a network that delivers fiber-optic performance not only on long-haul connections between cities, but in neighborhoods as well. *A broadband/wireless infrastructure fund*

temporarily managed by the federal government could pay for networks that would otherwise not be built, and leave them to be managed in the best hands: the private sector.

3.2: Green IT

While estimates vary, it is generally accepted that the IT sector produces about 2 percent of all carbon emissions on the planet today. A decade from now, the estimate will rise considerably as computers and devices become more powerful, consume more energy, and find more users. The goal is efficiency. Resources should flow to firms able not only to increase data processing or transmission with a fraction of the power, but also build IT that is efficient in other sectors, from manufacturing to home energy use. We should look for the wireless provider that can bring a mobile device to market that has a battery life of not a day or week, but a month or more. *A green IT initiative, including a reinvigorated government energy-saving program such as EnergyStar, should be part of any federal technology policy; it could spur industry to make the sorts of devices the marketplace wants and the environment needs.*

3.3: Next-Generation Computing

Moore's Law, the idea that computer-processing power doubles every eighteen months, has permitted the movement of 1980s supercomputing performance to the contemporary desktop. Engineering elements that have propelled this constant doubling and redoubling of processing power now offer diminishing returns, and others have hit practical walls. Parallel computing—the task of harnessing multiple processors or cores—is the obvious next step. However, this requires a broad reengineering of software. *The federal government should fund academic and industry research that will preserve Moore's law and produce the software necessary to exploit parallel computing across dozens, hundreds, or millions of processor cores.*

Recommendation 4: Public–Private Initiatives

4.1: Health Information and Computing Technology (ICT)

Former Secretary of Health and Human Services Tommy Thompson once remarked that “the most remarkable feature of this twenty-first century medicine is that we hold it together with nineteenth-century paperwork.” Private firms, large and small, have moved to supply digital information systems to hospitals and large clinics. However, the capacity for those institutions to

communicate with one another and with the smaller ambulatory practices, which still largely use paper records, remains limited. The result is an environment in which physicians make decisions in information-poor conditions and paper shuffling comes at an enormous cost. Nonprofit entities may be able to serve as a trusted third party, broker, and intermediary in the digitization and security of health data that is portable, current, and available when needed. *Government should foster interoperable standards for digital information transfer, spur nonprofit health IT operations, and subsidize the implementation of ICT systems in small practices where most Americans still receive primary care.*

4.2: Cybersecurity

Despite enormous investment by government and industry, no satisfying answer exists for the question, “In information security spending, how much is enough?” Reports of data breaches and potential vulnerabilities regularly make news, yet efforts to secure the cyber-infrastructure remain incomplete. The government has provided guidance to infrastructure operators and software developers, but vulnerabilities remain at an unacceptable level. We argue here for NGOs (including academia) to partner with the government to form information-sharing coalitions to address the information security problem. If the federal government—and in particular, the Department of Homeland Security—is to get serious, then it must move beyond a top-down approach. Developing knowledge-sharing communities that cross government-industry boundaries may help resolve the issue. *A non-government information security organization staffed largely with part-time civilian reservists and headquartered in Silicon Valley, with offices across the United States, would take the country a step forward in securing its cyber-infrastructure.*

4.3: Technology Education

While America’s universities remain among the world’s finest, drawing scholars from every corner of the globe, the public education system that prepared the majority of students at the country’s top colleges is now in crisis. The bill for years of falling math and science proficiency, rising dropout rates, and failed efforts to prepare young people for the workforce has come due. Teaching civics and preparing students for an assembly-line economy simply is not enough if the U.S. is to remain competitive in technology. If U.S. universities and corporations are to continue

to access homegrown talent, they must assume a greater role in fixing broken schools. IT will have an important part in such an effort. *A government program that compensates private firms and universities for providing the educational resources necessary to produce a new generation of computer and electrical engineers would improve America's ability to compete internationally and produce the sort of innovation essential for the economy.*

Recommendation 5: Federal Government IT Initiatives

5.1: Digital Diplomacy

During the Cold War with the former Soviet Union, President John F. Kennedy named journalist Edward R. Murrow to lead the United States Information Agency's (USIA) efforts in public diplomacy. The USIA's functions were transferred to the Department of State in 1999 when the agency was disestablished. While argument over the wisdom of this decision continues, the number of venues for the practice of public diplomacy has continued to grow. Although USIA-run libraries once served as a beacon, the Internet now brings mass connectivity to billions in the developed and developing worlds. Internet cafés in the Middle East may be both vehicles for societal development and cybermadrassas. The United States needs an innovative way to engage in public diplomacy in cyberspace. *We recommend the creation of a Center for Digital Diplomacy at the Department of State, where U.S. diplomatic professionals could work with America's immigrant population to send a clear message that the U.S. is present on the world stage and listening.*

5.2: Government's IT Management Workforce

The greatest single threat to the federal government is its inability to cope with complex design and production. Huge sums are invested in federal IT, but some government managers are seemingly unable to buy or successfully build large, complex systems. The intelligence community's reconnaissance satellite program, the FBI's case management software, and a host of other information management projects have foundered because those charged with their management lack the ability to communicate their needs and work with industry to deliver the product. While the contractor community is also culpable in these failures, blame can be shared. *The U.S. government needs to develop a cadre of IT managers skilled in both systems development and integration and program management. These managers should be trained to*

direct the actions of skilled contract personnel and be paid at near-private industry levels. Scholarships and favorable loan-repayment terms should be offered to individuals who have or are inclined to develop the necessary skills.

5.3: More Web 2.0

The greatest single achievement in intelligence community (IC) reform since the terror attacks of September 11 has been the implementation of Intellipedia. Intellipedia is a Web 2.0 wiki system patterned after the hugely successful Wikipedia. It has been used as a vehicle to break the severe stovepiping found in the IC. In addition, Intellipedia has been employed in the creation of the highest value intelligence products, including the National Intelligence Estimates. The federal government needs to expend more effort to improve information sharing across agencies and different levels of government and non-government actors. *We propose the creation of collaborative, unclassified Extrapedias in which the expertise necessary to solve problems and monitor events, from border management to scientific research, may be collected in secure collaborative repositories open to vetted contributors in and outside of government.*

5.4: Wiretapping

Although the continuing struggle to combat terror groups and other nonstate threats to the United States requires every intelligence tool possible, the effort to monitor the Internet and other digital telecommunications will continue to require balance. The Foreign Intelligence Surveillance Act was written in a time, not long ago, when international communication was exceptional, not ubiquitous. The warrantless wiretapping controversy has largely abated. However, without compromising sources or methods, it is important for the next administration to issue clear, unambiguous, and unclassified policy regarding the use of digital surveillance technologies to secure American lives, property, and interests at home and abroad. While it is essential to watch the Web and spot those who would do us harm, it is equally essential to monitor the Web and protect it from those who would do it harm. *The administration should consider the publication of an executive-level directive regarding U.S. intelligence policy and the Internet in which it admits that digital surveillance is conducted and that the product of that surveillance is used in a lawful manner.*

Conclusion

While this set of suggestions is by no means exhaustive, the clear message is that IT matters. A national energy policy is of vital importance and should receive great attention and consideration, but it should not be implemented at the expense of IT. Instead, we should ask how America's information edge may be utilized in a broader technology strategy. Whether in energy, national security, or health policy, IT will be an important—if not the most important—tool available for framing problems and bringing together the expertise necessary to solve them.



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ECONOMIC POLICY: RECOMMENDATIONS FOR THE NEXT ADMINISTRATION

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Overview

The Nobel laureate and internationally-renowned American economist Milton Friedman once said that policies should be judged not by their intention but by their outcomes. Indeed, the current financial crisis is primarily the result of well-intentioned but economically unsound policies designed to increase the rate of homeownership in the United States.¹ The new administration has indicated that it is prepared to act boldly to restore health to the nation's economy. Although decisive action is necessary at this time, it must be done with recognition of the looming fiscal crisis brought about by a gross imbalance in government spending versus revenue. Failing to address the fiscal imbalance will have devastating long-term effects on the nation's economy. Thus, the new administration faces the daunting task of steering the nation's economy back to health in the short term, while moving the government toward a path of fiscal responsibility in the long term.

Recommendations for Addressing the Short-Term Financial Crisis

- Refrain from increasing income taxes.
- Avoid policies aimed at insulating domestic producers from foreign competition.
- Leverage-to-capital ratios should focus on the market liquidity of assets as well as the maturity date of assets and debts.
- Create a Financial Product Safety Board.
- Improve financial disclosure and reduce the ability of firms to hold assets and liabilities in off-balance sheet accounts.
- Create a market for covered bonds in the United States as a means for financing mortgages and other infrastructure investments.
- Regulate financial innovation without being too restrictive.
- Plan an exit strategy to return government-owned shares of private banks and other institutions to the private sector.

¹ John W. Diamond, "The Financial Crisis of 2008," Baker Institute for Public Policy, <http://bakerinstitute.org/publications/TEPP-pub-financialcrisispeech-103008.pdf>.

- Increase government spending in the short run by moving forward with projects that have larger public benefits than public costs, extending unemployment benefits, and encouraging increased private investment.

Recommendations for Addressing the Long-Term Fiscal Crisis

- Reform the nation's entitlement programs, as they are financially unmanageable in their current state.
- Transform the role of unemployment taxes, and the benefits and training that workers receive in spells of unemployment, to help workers cope with increased competition from abroad.
- Reform the corporate tax system to reduce the burden of capital income taxation and tax compliance so as to increase the competitiveness of U.S. businesses at home and abroad. Recommended measures include broadening the corporate tax base and lowering the corporate tax rate.
- Reform the federal income tax system to promote economic growth and reduce administrative and compliance costs.
- In the long run, revenue increases should be derived from base-broadening tax policy changes as much as possible. The President's Advisory Panel on Federal Tax Reform² offers several good examples such as eliminating the deductibility of state and local taxes.
- Tax rate increases should be avoided in an effort to minimize economic distortions that shrink the level of production.
- Reduce the growth rate of government spending by minimizing increases in the cost of medical care, reduce Social Security and Medicare benefit payments by slowly increasing the retirement age overtime (for example increase the retirement age two to three months every year), and eliminating earmarks and ineffective government programs.

² Simple, Fair, and Pro-Growth: Proposals to Fix America's Tax System. President's Advisory Panel on Federal Tax Reform. November 2005. Washington, D.C. <http://www.taxreformpanel.gov/final-report/>.

I. Short-Term Financial Crisis

Background

In order to combat the ongoing financial crisis it is important to understand the policies that led to the crisis. Following the recession of the early 1990s, incomes grew and mortgage interest rates fell resulting in an increase in homeownership relative to the late 1980s. In 1994, President Clinton initiated the National Homeownership Strategy, which aimed to substantially increase homeownership among low- and middle-income households by relaxing lending constraints and creating flexible and innovative financing options. The policy increased homeownership by reaching out to populations that would not have qualified for a mortgage based on standard financial practices, but were able to do so under less stringent financial restrictions. Financial institutions were eager to lend to new customers and thus were complicit in the government's plan to increase mortgage lending and, in turn, the homeownership rate. In order to facilitate mortgage lending to previously unqualified buyers, financial institutions implemented many questionable and unethical lending practices.

After the dot-com bubble burst and the attacks of September 11, 2001, market dislocations and the potential for a deflationary price spiral led the Federal Reserve to drastically cut short-term interest rates. This fueled a boom in mortgage refinancing and an increase in demand for owner-occupied housing. From 2001 to 2006, widespread credit mania ensued as the use of home equity loans, cash-out refinancing, exotic mortgage loans (adjustable-rate mortgages, balloon notes, interest-only, Alternative A-papers, 100 percent+ financing, etc.), and 0 percent financing for the purchase of many consumer goods skyrocketed. The widespread use of credit to consume beyond our means led to deterioration in the balance sheets of U.S. households. Business balance sheets also deteriorated over this period as investments were made in increasingly risky assets. The slowdown in the growth of housing prices that began in mid-2006 exposed the faulty belief that house prices would continue to increase indefinitely. Reduced housing values combined with the resetting of adjustable-rate loans rendered homeownership unaffordable to many, causing a spike in home foreclosures. As foreclosures mounted, mortgage lending companies registered monumental losses. The hemorrhaging in the mortgage-lending industry, in turn, led

to massive losses in the investment banking and financial sector, as both were heavily invested in mortgage-backed securities and other mortgage-related investments.

Significant action by the outgoing administration has already been undertaken to combat the financial crisis. In September 2008, the U.S. government seized control of Fannie Mae and Freddie Mac, pledging a total of \$200 billion to prop up the struggling companies. Out of fears that a collapse of insurer American International Group, Inc. (AIG) would have dire national and global financial consequences, the U.S. government seized control of the company, lending a combined total of \$150 billion to the institution. In October 2008, Congress passed the all-encompassing \$700 billion Troubled Asset Relief Program (TARP), which allowed the Treasury to buy troubled mortgaged-related assets from financial institutions. However, the Treasury quickly deviated from the original plan of buying mortgage-backed assets in favor of a \$250 billion infusion of cash into the banking system. In November 2008, the Treasury Department and Federal Reserve made \$200 billion available to the consumer credit market by guaranteeing securities backed by credit card debt, student loans, and other debt. The government also provided Citigroup with a \$45 billion loan along with a guarantee to back \$306 billion of Citigroup's loans. Additional smaller measures have also been carried out by the outgoing administration.

Automotive Crisis

General Motors Corp., Ford Motor Co., and Chrysler LLC have also requested money from Congress during this financial crisis. The three firms are all facing serious financial turmoil, with General Motors and Chrysler indicating that they are on the brink of bankruptcy (Ford has stated that it can remain solvent for more than a year). Originally, the firms requested a \$34 billion bridge loan from Congress, which would allow the firms to continue operations, as well as to restructure and streamline operations. The House of Representatives passed a \$14 billion package that would have given substantial power to a government appointed car "czar" in order to insure successful transformation of the Big Three into competitive companies. The measure, however, stalled in the Senate. The Bush administration has since indicated that it will provide \$17.4 billion in short-term loans to the automobile makers. The funds are to come from the \$700

billion Troubled Asset Relief Program passed in October 2008. Companies receiving the money have until March 31, 2009, to produce viable business plans; otherwise, the loans must be repaid.

Providing direct government loans to the Big Three is unlikely to be effective in retooling the auto industry (no matter who is chosen as the car “czar”) as the problems facing the auto industry are multi-faceted, involving government regulations and tariffs, union inefficiency, current economic factors and general mismanagement. Gasoline prices, in particular, have played a major role in the current financial turmoil facing the Big Three. Although gasoline prices have recently subsided, elevated gas prices over the last few years were detrimental to the automakers, as each of the Big Three were heavily invested in the production of low fuel economy trucks and SUVs. The automakers have been publicly scolded for choosing to produce such vehicles, with many of the insults coming from the Washington, D.C., establishment. Production decisions, however, were the natural consequence of the 25 percent tariff Congress originally placed on the import of light trucks in 1963 and later expanded in 1980 and 1989. Given this pricing advantage, American producers were able to compete in the light truck market, which includes trucks, minivans, and SUVs. The heavy focus on the light truck market proved disastrous once gas prices increased and consumer demand shifted toward smaller more fuel-efficient vehicles. The recent financial crisis and ensuing credit crunch compounded the severity of the situation, putting a halt to the lion’s share of automotive lending, causing a dramatic decline in sales.

Also negatively impacting the Big Three automakers are contracts with the United Auto Workers (UAW) union. Although factory worker wages in union-operated plants are only slightly higher than wages in foreign-owned non-unionized plants, benefits are dramatically different, as union workers receive far more generous health insurance, job insurance, pensions and retirement healthcare. The three domestic companies are unable to delineate benefits based on competitive market factors, as union leaders control contract negotiations and possess a significant upper hand with the threat of organized strikes. And though the unions’ generous benefit contracts are not the sole reason for the companies’ financial troubles, unionization does hinder their ability to effectively and efficiently compete and operate in the market. Allowing GM and Chrysler to reorganize under Chapter 11 would provide the opportunity to restructure union contracts and

may be the best route to building a competitive American automobile industry; however, recent government actions indicate that this is unlikely to happen.

Recommendations for Addressing the Short-Term Financial Crisis

History has taught that expansionary monetary policy is one of the most useful tools in aiding a fledgling economy. During the Great Depression, banks were allowed to fail, while reserve requirements were increased. These policies caused a freeze in lending and a drastic decline in the nation's money supply. Christina D. Romer's³ research on the Great Depression indicates that expansionary monetary policy aided in the nation's economic recovery. Tyler Cowen⁴ echoes this sentiment, noting that, "Roosevelt's best policies were those designed to increase the money supply, get the banking system back on its feet, and restore trust in financial institutions." We should follow the same types of policies now. Indeed, the Federal Reserve has been very aggressive in implementing a loose money policy and has vowed to use every tool in its arsenal. Additionally, the following policies could help restore confidence in the economy and trust to the banking sector:

- Leverage-to-capital ratios should focus on the market liquidity of assets as well as the maturity date of assets and debts. In doing so, banks would increase their financial stability and decrease the likelihood of short-term crisis induced collapse.
- Create a Financial Product Safety Board to provide investors with greater information. The board would protect investors and the economy by curbing unscrupulous investments.
- Improve financial disclosure and reduce the ability of firms to hold assets and liabilities in off-balance sheet accounts. The new rules would expose financially unsound companies and limit business fraud.
- Create a market for covered bonds in the United States as a means for financing mortgages and other infrastructure investments. Covered bonds function similarly to asset-backed securities; however, they provide two distinct advantages in that they stay

³Christina D. Romer, "What Ended the Great Depression?" (Working Paper 3829, National Bureau of Economic Research, Cambridge, MA, 1991).

⁴ Tyler Cowen, "The New Deal Didn't Always Work, Either," *New York Times*, November 23, 2008.

on the issuer's balance sheet and investors have recourse against the issuer and pool of assets.

- Regulate financial innovation without being too restrictive. Regulation of financial products is clearly necessary, as aggressive and unethical lending in the mortgage industry has had dire consequences on the entire economy. As innovation does need to be encouraged, regulation should aim to prevent unethical and economically detrimental financial products from entering the market.
- Plan an exit strategy to return government-owned shares of private banks and other institutions to the private sector. The government measures were put in place to steady the market, increase consumer confidence, and jump-start lending in the short term. An exit strategy is necessary, as it would be harmful and ineffective for the government to have long-term involvement in the decision-making and operations of private banks and institutions.
- Increase government spending in the short run by moving forward with projects that have larger public benefits than public costs. Engaging in public spending projects simply for the sake of economic stimulus without regard to a cost-benefit analysis is highly inefficient. As the government has already spent \$3 trillion to aid and stimulate the economy, further spending should be undertaken with prudence.

Policies that the federal government should avoid to keep from exacerbating the current crisis include:

- Increasing taxes. According to the empirical results presented by Mountford and Uhlig,⁵ a surprise deficit-financed tax cut stimulates economic production more than a deficit-financed increase in government spending. This is at odds with the textbook Keynesian model, which predicts government spending would provide a larger stimulative effect.
- Protectionism. Policies aimed at insulating domestic producers from foreign competition are detrimental to innovation, competitiveness and profits. The automobile industry is a prime example of the harm caused by protectionist policies (tariffs). Further, as free trade agreements have been successful in encouraging domestic economic growth, new

⁵ Andrew Mountford and Harald Uhlig, "What are the Effects of Fiscal Policy Shocks?" <http://sfb649.wiwi.hu-berlin.de>.

agreements should be pursued with other democratic governments such as Columbia and South Korea.

II. Long-Term Fiscal Crisis

Background

The cost of the multiple government bailouts and other economic measures to combat the current financial crisis is well over \$3 trillion and increasing. This figure, however, pales in comparison to the funds needed to bail out the U.S. government. In fiscal year 2008, the government's annual budget deficit totaled \$455 billion, with that figure projected to potentially increase to over \$1 trillion in 2009. The total national debt stands at \$10.8 trillion as of September 30, 2008, while the government's total fiscal exposure, which includes explicit liabilities the government is legally obligated to fulfill, is more than \$53 trillion. Continuing on the path of fiscal irresponsibility is no longer viable and could have dramatic consequences in the next 20 years if actions are not taken to balance the federal budget.

The nation's most costly entitlement programs include Social Security, Medicare and Medicaid. Currently, these three programs account for approximately 42 percent of total annual government spending. The share of government spending on these entitlement programs is expected to increase dramatically in the coming years as a growing share of baby boomers retire and begin drawing Social Security and Medicare benefits. The fundamental problem facing Social Security is the system's pay-as-you-go design. Currently, there are ample employees paying into the system to cover the number of retirees receiving benefits. However, it is estimated that by 2017 the cash flow of the Social Security program will be negative, as obligated benefits will exceed receipts. Similarly, long-term financial problems face the Medicare and Medicaid programs. Though these programs are not systematically flawed, they are overly costly and painfully inefficient for the level of care they provide. In 2006, government outlays for the Medicare and Medicaid programs exceeded \$560 billion, a staggering 20 percent of all federal spending and 5 percent of gross domestic product. While spending on these programs has greatly increased, the Congressional Budget Office (CBO) has argued that the increased government payouts have not

resulted in improved quality of health for program enrollees. For example, CBO estimates that 30 percent of government health spending does not increase quality of care. Clearly, reforms of government-run healthcare programs, along with Social Security, are necessary to achieve long-term sustainability.

The imminent long-term fiscal crisis threatens to significantly decrease the welfare of future generations. To remedy the situation, revenue will have to increase and spending will have to decrease if fiscal balance is ever to be achieved. As the main source of government revenue is the income tax, raising revenue involves raising taxes, which can be done through broadening the tax base or increasing tax rates. Base broadening should be main source of raising additional revenue under the income tax since increasing tax rates would reduce economic growth because of the distortionary effects of marginal tax rates. The Obama administration has indicated it will not raise taxes at this time and will increase spending in order to stimulate the economy. Though this may seem necessary due to the current state of the economy, it will further exacerbate the fiscal imbalance and increase the national debt. Unfortunately, using government spending as a fiscal stimulus is often poorly timed and grossly inefficient. This is likely to especially be true given that a \$1 trillion fiscal stimulus package being discussed. We must avoid poorly timed and inefficient fiscal stimulus spending. We should focus on moving forward projects that can pass standard benefit-cost analysis and avoid increasing government spending just for the sake of stimulating the economy. We should also focus of fiscal stimulus proposals aimed at extending unemployment insurance and food stamps and increasing private investment.

The current tax system is in tatters and is in dire need of fundamental reform. It hampers U.S. businesses from competing in an increasingly integrated global marketplace. It is riddled with loopholes, haphazard provisions and often undermines our perception of fairness. Most importantly, it is often counterproductive in terms of promoting economic growth. It is also overly complex and largely temporary. Given that revenues already fall short of funding government operations and that additional revenue will likely have to be raised to balance the long term federal budget, serious consideration should be given to fundamentally reforming the US tax system. The goal should be a tax system that promotes economic growth and is simple and fair.

Recommendations for Addressing the Long-Term Fiscal Crisis

To move the nation toward a path of fiscal responsibility in the long term, the next administration should:

- Reform the Social Security, Medicare and Medicaid programs, as they are financially unmanageable in their current state.
- Transform the role of unemployment taxes and the benefits and training that workers receive in spells of unemployment. A focus on more effective job search techniques and the development of marketable new skills will help workers cope with increased competition from abroad.
- Reform the corporate tax system to reduce the burden of capital income taxation and tax compliance. Recommended measures include broadening the corporate tax base and lowering the corporate tax rate. Adopting these measures would increase the competitiveness of U.S. businesses at home and abroad.
- Reform the federal income tax system to reduce administrative and compliance costs and promote economic growth.
- Raise any additional revenue by broadening the income tax base.
- Refrain from increasing income tax rates that would increase economic distortions and reduce economic growth.
- Reduce the growth rate of government spending by minimizing increases in the cost of medical care, reduce Social Security and Medicare benefits by increasing the retirement age slowly, and eliminating earmarks and ineffective government programs.

Conclusion

Our nation's future is at stake if we continue on the path of fiscal irresponsibility. Thus, balancing the long-run federal budget through tax reform and drastic cuts in government spending should be a top policy priority for the next administration. Accomplishing this will require tough economic choices that are most likely to occur with strong presidential leadership and ample bipartisan support. In this time of economic crisis, it is of great importance that the new administration heeds Professor Friedman's sound advice and carefully considers the long-term implications of all new policy initiatives.



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THE U.S. HEALTH COST CRISIS: RECOMMENDATIONS FOR THE NEXT ADMINISTRATION

BY

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The U.S. Health Cost Crisis: Recommendations for the Next Administration

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The U.S. Health Cost Crisis: Recommendations for the Next Administration

Overview

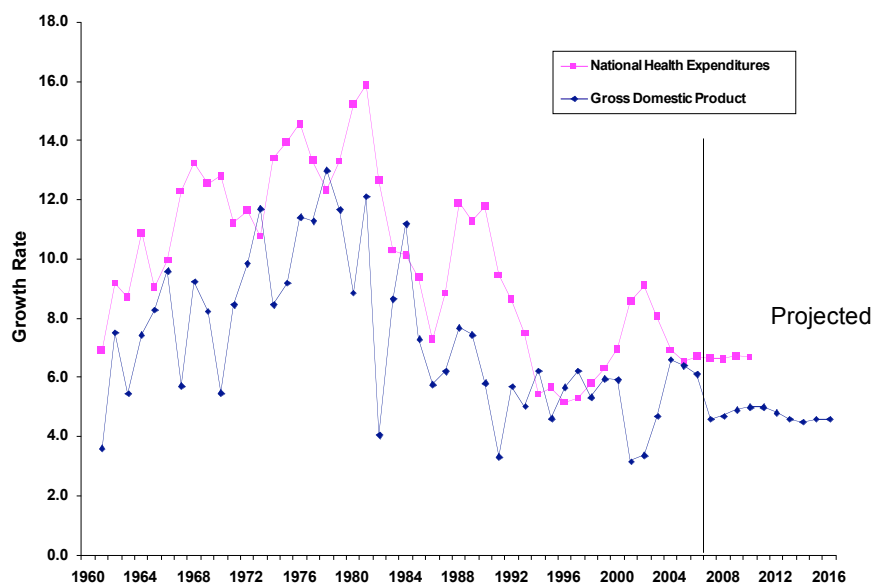
Revising Medicare policies will directly influence health care spending on the elderly, who account for one-third of all U.S. health care spending and thus indirectly influence spending decisions for the 200 million Americans covered by private health insurance. Specifically, the Centers for Medicare & Medicaid Services (CMS) should take two significant steps towards reforming Medicare by:

- **Recommendation 1:** Requiring coverage only for cost-effective technologies, and
- **Recommendation 2:** Basing reimbursement of providers on pay for performance.

Background

Since 1970, the annual growth rate of U.S. national health expenditures has exceeded the growth of the nation's economy in almost every year. National health expenditures surpassed \$2 trillion in 2006 and are projected to exceed \$4 trillion in 2016. In 1970, health care comprised 7.2 percent of gross domestic product (GDP). Health care now comprises 16 percent of the economy and is projected to account for 19 percent of GDP in 2016.

Figure 1: U.S. National Health Expenditures and GDP Growth Rates, 1960–2016

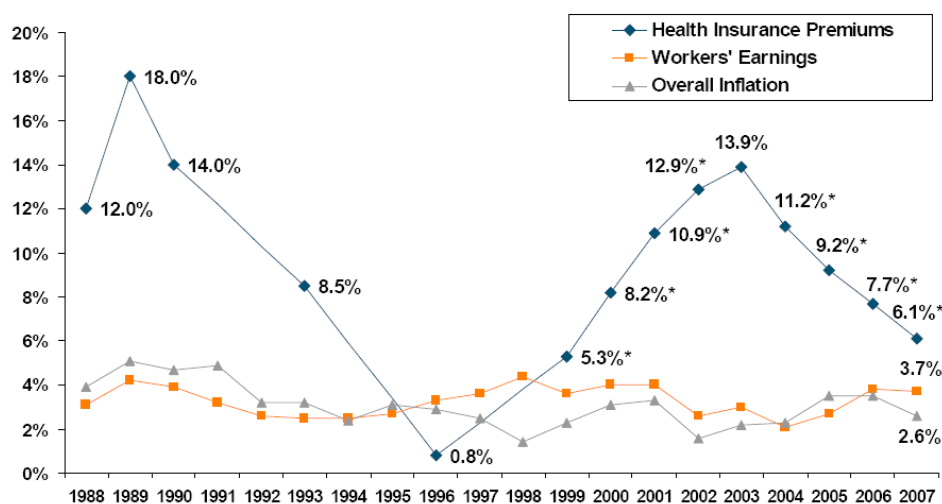


Source: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Expenditure Data

The U.S. Health Cost Crisis: Recommendations for the Next Administration

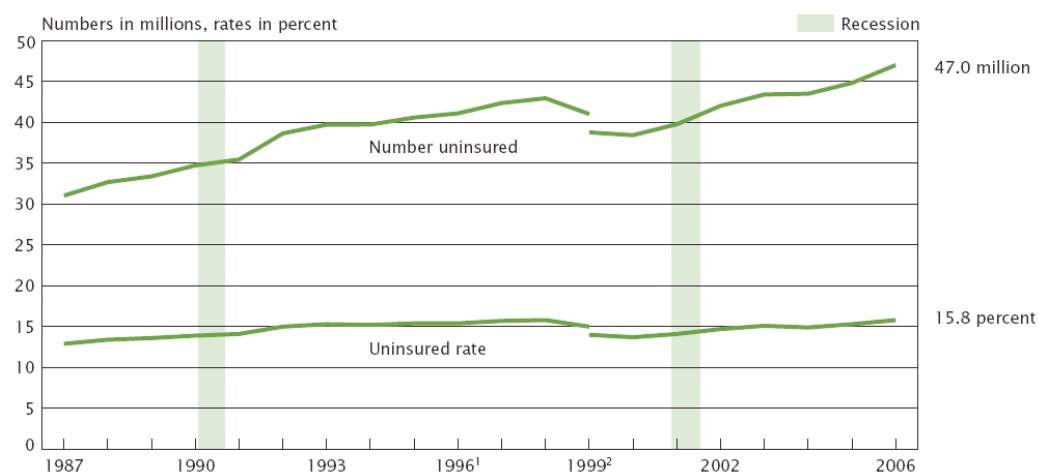
Correspondingly, insurers have raised premiums on health insurance in order to cover the rising costs of reimbursing health care providers for patient care. Since 1999, increases in health insurance premiums have vastly exceeded wage inflation and overall inflation in every year. Rising health insurance premiums have gradually priced increasing numbers of consumers out of the health insurance market, so that 47 million U.S. residents, or 16 percent of the population, lack health insurance coverage.

Figure 2: Health Insurance Premium Increases Compared to Other Indicators, 1988–2007



Source: Kaiser/HRET Survey of Employer Health Benefits 2007, Chart Pack, Exhibit 1

Figure 3: Number Uninsured and Uninsured Rate, 1987–2006



Source: U.S. Census Bureau, Current Population Reports, *Income, Poverty, and Health Insurance Coverage in the United States: 2006*, Figure 6

The U.S. Health Cost Crisis: Recommendations for the Next Administration

Several past studies have documented the devastating effects of living without health insurance coverage. An estimated 18,000 individuals die prematurely each year due to lack of insurance.¹ Medical problems contribute to half of all bankruptcies in the United States, and these bankruptcies are directly linked to lack of health insurance or under-insurance.² The plight of the uninsured has also been documented by the media and in popular books.³⁻⁵

Indeed, health insurance coverage was a major issue for voters during the 2008 presidential campaign, and the new president and Congress are likely to enact legislation to expand health insurance coverage for children within the first ninety days of taking office. Yet the drive to expand health insurance coverage fails to acknowledge the root cause of the rising uninsured rate: Americans cannot afford to purchase health insurance because health care has become too costly. Unless we can control rising health care costs, we will expend valuable resources to bring more individuals into a system that is fundamentally broken. The effort will ultimately fail, as government expenditures on health care will become unsustainable.

Recommendations

Recommendation 1: Requiring coverage only for cost-effective technologies

Medicare currently reimburses providers for medical treatments based only on effectiveness, not on value. As stated in Congressional testimony in 2007 by Peter Orszag, Congressional Budget Office (CBO) director, “The Medicare program has not taken costs into account in determining what services are covered and has made only limited use of comparative effectiveness data.” That is, Medicare is paying for some expensive technologies that “work,” but they don’t work very well.

An example of a technology covered by Medicare that is costly but of limited value is the left ventricular assist device (LVAD). LVADs are heart pumps for acute heart failure patients who are ineligible for heart transplant. A recent study calculated that the cost per quality-adjusted life year gained from using LVADs is £170,616.⁶ This figure represents the incremental costs of providing a patient with an LVAD, divided by the gain in life expectancy from the LVAD, adjusted for the fact that this increased life expectancy would not be spent in perfect health.

The U.S. Health Cost Crisis: Recommendations for the Next Administration

Another U.S. study attempted to factor in future improvements in health technology and assumed that LVADs will be able to achieve a 15 percent reduction in mortality for heart failure patients by the year 2015.⁷ Even with this optimistic assumption, LVADs were predicted to cost \$511,962 (in 1999 dollars) per additional life year gained. The additional cost of LVAD use to Medicare was predicted to reach \$10.1 billion in 2015.

Health economists tend to view medical technologies that cost \$100,000 per life-year saved or lower as cost-effective and worth paying for. A recent study based on detailed economic modeling estimated that the value of a life-year peaks at \$350,000 at around age 50.⁸ Under either criterion, the price tag for the LVAD indicates that it does not provide sufficient value to the patient, relative to its costs. The additional cost per improvement in health status is just too high, and LVADs should not be covered by Medicare.

A second example of high-cost low-value health care is treatments for back pain. A 2002 U.S. survey found that 26 percent of adults reported low back pain. Thus, the condition is widespread and accounts for a significant portion of health expenditures. Researchers estimated that the medical costs per patient of treating individuals with spine problems rose from \$4,695 in 1997 to \$6,096 in 2005.⁹ Yet over this same time period, self-reported mental health, physical functioning, work/school limitations and social limitations were all worse. In a span of eight years, this increase in expenditures was estimated to represent \$85.9 billion in added costs to the health care system, but there was no demonstrated improvement in patient outcomes. Policymakers and clinicians must carefully review coverage decisions for back pain treatments to determine whether any of these treatments are of value to patients.

In other cases, Medicare and private insurers reimburse health care providers for high-cost treatments that are provided to the wrong patient population. For example, patients with stable coronary artery disease may benefit from an angioplasty to widen narrowed blood vessels. Clinical guidelines state that patients must undergo a stress test before undergoing elective angioplasty in order to confirm the presence of restricted blood supply. However, a recent study determined that only 44.5 percent of Medicare patients underwent stress tests prior to angioplasty.¹⁰ These figures suggest that a significant portion of angioplasties reimbursed by Medicare

The U.S. Health Cost Crisis: Recommendations for the Next Administration

were unnecessary and needlessly placed patients at risk of complications from a complex medical procedure. Over 800,000 angioplasties are performed in the United States each year, and Medicare reimburses \$10,000 to \$15,000 per case. Therefore, there are significant savings to be achieved by requiring confirmation of the necessity of an angioplasty through a stress test.

Moving the Medicare system (and, in turn, the U.S. health care system) towards high-quality, efficient health care requires the application of cost-effectiveness analysis when making coverage decisions for all costly medical treatments. These treatments may be costly because individual treatments are extremely expensive, or because the treatments are moderately costly and administered to substantial numbers of patients. In either case, policymakers and clinicians must determine whether each medical intervention yields health improvements to the patient that are worth the additional costs. The methodology for conducting such economic evaluations has matured over the last two decades, and we now have sufficient data and expertise for conducting these analyses.

One of the challenges of redirecting Medicare's focus to cost-effective technologies is shielding coverage decisions from the influence of health care providers and health technology manufacturers who are in danger of losing significant sources of revenue based on specific changes in reimbursement policy. For example, the Agency for Healthcare Research and Quality was in danger of elimination in the mid-1990s after issuing practice guidelines for back pain treatment which excluded existing forms of care for which physicians were receiving significant reimbursement. Whether CMS directly conducts cost-effectiveness analysis, or the task is assigned to a separate government agency, funding must not be linked to sources which can be influenced by political lobbying.

In addition, efforts must be made to educate the public on the intent of cost-effectiveness analysis. Patients are accustomed to believing that any treatment recommended by their physician must be highly effective. We must help patients understand that Medicare cannot and should not cover every possible medical treatment offered by the medical establishment. The government can dramatically improve its ability to identify technologies that are worth the additional cost and eliminate waste from the health care system. By reining in health care cost

The U.S. Health Cost Crisis: Recommendations for the Next Administration

increases, the public will benefit from lower taxes to pay for Medicare, lower private health insurance premiums, and increasing rates of health insurance coverage.

Recommendation 2: Basing reimbursement of providers on pay for performance

The current reimbursement methodologies for hospitals (the DRG system) and for physicians (the RBRVS system) reimburse providers for the quantity of care, rather than the quality of care provided. For example, the intent behind the DRG system was to reimburse hospitals a preset fixed rate based on the diagnosis for which the patient was admitted, regardless of the patient's length of stay. Prospective reimbursement would encourage hospitals to treat patients and prepare them for discharge as soon as possible, so that hospitals could earn profits by retaining the difference between the DRG reimbursement rates and their costs of patient care. Yet over 40 percent of DRGs are related not to diagnoses such as coronary heart disease, but to the performance of specific intensive procedures such as open heart surgery.¹¹ Instead of reimbursing hospitals and physicians for each additional procedure performed, Medicare should be basing payment on patient outcomes.

Medicare has already made some movement towards pay for performance. For example, just this year CMS has discontinued reimbursement for preventable complications of medical care. Previously, if a patient suffered a pressure ulcer or a catheter-associated urinary tract infection during a hospital stay, the hospital would receive additional reimbursement for treating these complications. Yet such complications are the consequence of low-quality hospital care, so hospitals were essentially being rewarded for providing substandard treatment. With the elimination of reimbursement for treating these complications, hospitals now have increased financial incentive to provide higher-quality care.

Yet CMS could do much more to encourage higher-quality care. Currently physicians and hospitals bill Medicare separately for services provided to patients. Thus, there is no financial incentive for these two entities to coordinate care. For example, I am aware of a quality improvement officer for a major teaching hospital who asked the hospital's chief financial officer for pilot project funding to initiate an outpatient care program for congestive heart failure patients that would reduce their need for hospital admissions. The CFO refused, on the grounds

The U.S. Health Cost Crisis: Recommendations for the Next Administration

that fewer admissions of congestive heart failure patients would result in lower hospital revenues.

To remedy such problems, Medicare should move toward bundled payments of health care providers. For example, Medicare could pay a single entity (a hospital and its affiliated physicians) a fixed amount to cover the costs of providing all Medicare-covered services for an episode of care.¹² In the case of congestive heart failure patients, Medicare could pay a fixed amount for all care related to congestive heart failure for an initial hospital stay and up to six months following discharge.

Hospitals and physicians will argue that coordinating care and determining which share of revenues each party should receive is too complicated. Yet pilot projects with bundled payments conducted by Medicare in the early 1990s for coronary bypass surgery demonstrated drastic reductions in expenditures with this reimbursement approach. Providers will also argue that bundled payments cannot take into account important differences in patient severity that will influence patient costs and outcomes. Yet advances in information technology have lowered the costs of obtaining detailed patient information, so that risk adjustment has become more accurate and feasible for many patient cases.

Conclusion

We are living in a remarkable new age of advanced technologies and improved quality of life. Physicians and scientists have developed several important new technologies over the past three decades that have contributed to significant gains in life expectancy and health status. The Medicare program has provided an invaluable safety net to the country's elderly, many of whom would not be able to afford the complex advances in medical care otherwise.

Yet the Medicare program has been poorly structured to encourage the provision of efficient, high-quality medicine. Instead, the unchecked dissemination of medical technology has led to the diffusion of many expensive treatments that have little benefit for patients, and the application of many treatments to inappropriate patient populations. Policymakers, health care providers, and

The U.S. Health Cost Crisis: Recommendations for the Next Administration

private insurers must collaborate to reform coverage decisions and provider payment. The public must also be educated on the meaning and benefit of cost-effective medical care. Controlling rising health care costs is essential to insurance access to high-quality care for as many Americans as possible. Failure to control health care expenditures will place the physical and economic health of our nation at risk for years to come.

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U.S. GASOLINE POLICY: RECOMMENDATIONS FOR THE NEXT ADMINISTRATION

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Overview

The United States is the world's largest energy consumer, and increasing gasoline consumption is the single most important factor behind the rising American dependence on foreign oil.

In order to lessen long-term demand for gasoline in the United States and thereby reduce the chances of gasoline price spikes, rising oil imports, and related hardship to the U.S. economy from oil price volatility, we recommend the following policies be adopted in the United States:

1. Raise the U.S. corporate average fuel efficiency (CAFE) standards to 50 miles per gallon;
2. Negotiate to have an international CAFE standard among major oil consuming countries as part of a global climate agreement;
3. Phase in a higher federal gasoline tax to maintain conservation gains;
4. Require industry to hold average minimum gasoline inventories;
5. Establish a special diplomatic energy envoy to China;
6. Substantially increase federal spending on new energy technologies, energy efficiency, and alternative energy; and
7. Avoid overly complex fuel policies to restrict carbon in the transportation sector, such as a national low carbon fuel standard (LCFS).

Background

High and wildly fluctuating gasoline prices are a problem for average Americans and small transport dependent businesses, and can be particularly problematic for low income and middle class households. For example, in the summer of 2008 when gasoline prices reached a national average of \$4.11 per gallon, Americans earning less than \$15,000 a year were spending as much as 15 percent of their household income on gasoline, double the proportion just seven years earlier. With unpredictable fuel costs, planning monthly household expenditures becomes difficult, which can be detrimental to individual welfare and the overall U.S. economy.

The United States is the third largest oil producer in the world, but domestic oil fields cannot meet growing demand because U.S. oil production has been generally declining since 1970 as older fields are being depleted and other nonproducing, oil-bearing regions remain off limits to drilling. As a result, the United States is now more dependent on foreign oil than ever before. It imported 13.5 million barrels per day (b/d) in 2007, or about 65 percent of total consumption as compared to 35 percent of total consumption in 1973. Moreover, U.S. oil demand is up by almost 20 percent over demand in 1973.

This increased dependence contributes to a worsening U.S. trade balance, thus putting pressure on the U.S. dollar. The U.S. oil import bill totaled \$327 billion in 2007 and will likely be about \$450 billion in 2008. The U.S. oil import bill accounted for as much as 40 percent of the overall U.S. trade deficit in 2006, compared to only 25 percent years earlier. The financial burden associated with this unprecedented import bill has stoked inflation and created challenges for the U.S. economy. Sudden, massive financial transfers to oil-producing countries as oil prices rise also create global “hot money” investment bubbles, such as those that have plagued the financial system in recent years and contributed to the current U.S. banking and financial crises.

Today, the U.S. supply of oil is no more secure than it was after the 1973 oil crisis. Moreover, dependence on oil for mobility has never been stronger. All told, there are over 240 million road vehicles in the United States, or almost one vehicle for every person. Each vehicle is driven, on average, more than 12,000 miles annually, and virtually all vehicles are powered by either gasoline or diesel fuel. As a result, despite the fact that the United States accounts for only 5 percent of the world’s population, it consumes more than 33 percent of all the oil used for road transportation in the world. Currently, China has about 26 million vehicles and consumes about 6 percent of all the road fuel produced in the world, despite having a population that is about four times the size of the U.S. population. As the number of motor vehicles in China and other developing countries increases, so will global oil demand. This shift will place increasing pressure on the United States, in the interest of energy security, to improve efficiency and find alternative fuels for transportation.

Rising U.S. oil imports have been a significant factor strengthening OPEC's monopoly power in international oil markets. U.S. net oil imports rose from 7.1 million b/d in 1990 to 12.5 million b/d in 2005, while global oil exports (oil that was exported across borders from one country to another) rose from 32.3 million b/d to 44.3 million b/d over the same period. In other words, the United States accounted for about 45 percent of the increase in global oil trade over this period. This allowed OPEC to increase its share of the global market from 38 percent in 1990 to 43 percent in 2005—a market share not seen since 1980.

Since U.S. imports represent a large share of the market for internationally "traded" oil, incremental U.S. oil purchases affect the overall international market price of oil. Therefore, to the extent that the United States—or some group of large, oil-consuming countries—takes actions to reduce oil demand, it can lower the market price of oil and reduce the monopoly power of key oil-producing countries, some of whom may have hostile intentions towards the United States and its allies. It has been well established that OPEC frequently changes its price targets in response to changes in market demand. Lower demand resulting from the current global recession is what has forced OPEC to lower its oil price target. Thus, if lower oil demand can be maintained at lower prices without compromising economic growth, the United States should consider how to achieve this lower demand in formulating future domestic motor fuels policies.

There could be a great benefit to the future strength of the U.S. economy and to the global oil balance if the United States could cost effectively curb its use of gasoline. At present, the United States lacks the domestic refining capacity to meet rising summer demand from ongoing refinery output. This has made the U.S. summer gasoline market more dependent on imported gasoline, increasing the chances of a summer price spike. But as retail gasoline prices were rising substantially in 2007 and 2008, Americans started driving less. Preliminary statistics from the U.S. Department of Transportation indicated that in 2007, vehicles miles traveled by American drivers fell by 2 percent, and sales of SUVs, which are generally less fuel-efficient than cars, were down 40 percent. U.S. oil demand was off slightly from 2006 to 2007, and fell by an estimated 5 percent through 2008. Now is the perfect time to enact new long-range policies that ensure we avoid a return to the rising gasoline demand that is deleterious to the long-term strength and stability of the U.S. economy and the welfare of average Americans.

An added benefit to lowering U.S. gasoline use is the reduction of greenhouse gas (GHG) emissions, thereby supporting a stronger, more effective U.S. climate policy. In 2005, the United States emitted a total of 712 million metric tons of carbon—412 million metric tons of which came from road petroleum use. The country emits more energy related carbon dioxide per capita than any other industrial nation. In the 1990s, the U.S. transportation sector represented the fastest growing emissions of carbon dioxide of all the other major sectors of the U.S. economy.¹ The U.S. Department of Energy recently predicted that the transport sector will generate almost half of the projected 40 percent increase in U.S. carbon emissions through 2025.

Recommendations

Recommendation 1: Raise the U.S. corporate average fuel efficiency (CAFE) standards to 50 miles per gallon.

In 2007, U.S. Congress passed new CAFE standards. According to a study by the James A. Baker III Institute for Public Policy, the new 35-mile-per-gallon fuel efficiency standard will shave 2.3 million b/d from U.S. oil demand by 2020. We must not undo this regulation because Detroit has fallen on hard times. Pushing for a more ambitious target of 50 miles to the gallon could save as much as 7 million b/d of oil over what would be consumed if we did nothing.

Recommendation 2: Negotiate to have an international CAFE standard among major oil consuming countries as part of a global climate agreement.

Projections indicate that more than 75 percent of the increase in oil demand between now and 2030 will come from the transportation sector. Burning of transportation fuel will also represent 25 percent of future energy-related GHG emissions. The United States can take the lead in establishing new constructive policies for a post-Kyoto climate agreement by pushing international car makers, including those in China and India, to formally establish a concrete minimum level for corporate average efficiency standards for the cars produced in every important car-producing nation. Tight standards for operating efficiency for the global automobile fleet would significantly lower overall oil demand growth over the next 20 years and, at the same time, substantially reduce GHG emissions.

¹ Joseph Romm, “The Car and Fuel of the Future,” *Energy Policy* 24 (2006): 2609-2614.

Recommendation 3: Phase in a higher federal gasoline tax to maintain conservation gains.

Many governments in Europe and Asia have been able to reduce the negative effects of price variability by increasing energy efficiency and reducing dependence on oil through the use of hefty consumer taxes on oil and oil products. Higher taxes have limited growth in national gasoline demand by promoting efficiency and conservation. At the same time, these countries have been able fund various social programs with the tax revenues while their gasoline demand has remained relatively flat for more than two decades. In the United States, where gasoline-tax-funded social programs are currently not as large, the increased tax revenues from a larger gasoline tax could be beneficial in providing a rebate to lower income households to offset any regressive effects of the tax, repairing aging bridges and roads, developing public transportation options, and funding research into alternative energy technologies.

A gradual phase in of a higher gasoline tax would give consumers time to make adjustments to mitigate the rising gasoline costs by arranging for alternatives such as carpooling, increased use of public transportation where applicable, purchase of a more fuel-efficient car, etc. The revenues associated with a larger gasoline tax might also stimulate more confidence in the U.S. dollar through a healthier fiscal budget, which, in turn, would contribute to an improvement in the overall U.S. economic performance.

Data indicate that as retail prices increase, American's driving habits tend to change. Using existing estimates from the economic literature, a tax on the order of \$0.50 per gallon, pushing today's average pump prices up from \$1.50 to \$2.00 per gallon, could be sufficient to hold gasoline demand fixed at current levels. This would also result in additional annual federal receipts of about \$75 billion at 2007 consumption levels of about 142 billion gallons per year.

Recommendation 4: Require industry to hold average minimum gasoline inventories.

At peak summer demand during normal economic times, the United States lacks the domestic refining capacity to meet demand from ongoing production. In general, demand in the summer is higher than in other times of the year. In particular, demand for gasoline tends to rise around the summer holidays such as Memorial Day and Labor Day and, to a lesser extent, the Fourth of July, as American consumers go on vacation. Existing refinery capacity in the United States is

not capable of producing enough gasoline to meet this higher demand. Thus, when seasonal demands increase, we must use gasoline that has been stored during times of lower demand or rely on imports. If demand rises, and inventory is not sufficient or there is difficulty in importing gasoline, then prices can skyrocket because demand in the short run is fairly unresponsive to changes in price. This has happened with increasing frequency in the United States during the past several summers. In 2007, demand peaked in the summer at about 9.7 million b/d, and refinery output of gasoline that same month was about 9.2 million b/d. During the disruptions to U.S. refinery output in the aftermath of Hurricanes Rita and Katrina, the United States had to borrow gasoline from European strategic gasoline stocks because, unlike Europe and Japan, the United States has no strategic minimum stockpiling requirements for domestic commercial gasoline inventories.

In recent years, rising U.S. gasoline demand, which has been coupled with low inventories, has encouraged increased imports and higher price volatility. The industry's inability to raise carrying capacity along with persistent annual increases in overall demand has resulted in an increasing reliance on imports of gasoline. This pattern, which has accelerated in recent years, begs the question, "Why have rising prices not encouraged an increase in inventory capacity?" It also highlights the need to revisit U.S. gasoline inventory policies.

Hurricanes Katrina and Rita in 2005 and Gustav and Ike in 2008 exposed the potential supply shortages and price spikes that can occur when gasoline inventories are inadequate in times of extreme stress on production and delivery infrastructure. Higher levels of market area stocks of gasoline would have likely prevented the sudden outages and high prices that plagued consumers following those events. One possible policy fix would be to regulate minimum level of mandatory gasoline inventories, similar to what is currently done in Europe. Such a system exists in Europe and has allowed Europe the flexibility to provide gasoline to the United States during production shortfalls that occurred during past hurricane seasons, thus preventing even worse dislocations. Adopting such policies in the United States would carry a public benefit of protecting consumers and the U.S. economy from the negative effects of extreme swings in gasoline prices. Such government-mandated stockpiles could also be used to supplement supplies during evacuations from severe storms and to prevent fuel outages along key evacuation routes.

A minimum gasoline inventory level for industry makes more sense than federal government-held stocks because of the physical specifications for gasoline, which has a shorter shelf life than crude oil. Thus, gasoline inventories would need to be cycled over time, but this can be done easily by industry so long as there are prespecified sustained minimum levels. Although such a policy would place an additional cost on industry, this cost could be offset by allowing a small price markup that guarantees a rate of return, much as regulatory agencies permit in the power generation and natural gas industries.

Recommendation 5: Establish a special diplomatic energy envoy to China.

Appointing a senior U.S. diplomat with energy experience to serve in a new post as an energy diplomacy liaison to Beijing could jump-start more proactive policy coordination and new energy initiatives between the two countries. The goal should be the development of a harmonized energy policy enhancing the leverage both countries would have in dealing with oil-producing nations. Energy strategy collaboration with China would also pave the way for broader coordination on global warming policy, removing a key barrier to U.S. political agreement to a post-Kyoto international accord.

The new China energy liaison could report to the vice president, who could take a diplomatic lead on a high-level, U.S.–China energy dialogue, much the way Al Gore and Viktor Chernomyrdin discussed U.S.–Russian energy cooperation in 1990s, paving the way for U.S.–Russian joint investment in major energy projects.

Recommendation 6: Substantially increase federal spending on new energy technologies, energy efficiency, and alternative energy.

More aggressive research and development spending—particularly in electricity storage and transmission—could facilitate a switch to hybrid plug-in electric automobiles that tap renewable energy as a fuel source to compete with conventional gasoline.

The existence of viable alternative energy technologies creates an incentive for oil producers to avoid oil price shocks and supply disruptions for fear that the new technologies would be more rapidly adopted, permanently displacing oil use. Alternative energy supplies can provide ready

substitutes if the price of oil rises too sharply and can shield the economy from the negative impact of disruption of any one fuel source. At present, gasoline has no major substitute fuel that can be quickly and broadly disseminated into widespread use across the United States during a major disruption or oil pricing shock.

Alternative energy can reduce vulnerability to oil producer monopoly power and oil price shocks. The deployment of plug-in hybrid or other fuel-saving car technologies could have a dramatic effect on future oil demand trends, as well as play a major role in lowering carbon dioxide emissions by advancing fuel efficiency. The benefits of energy efficiency in protecting economies from oil price variability are well-known. Japan's energy efficiency was one reason that country did not experience a severe recession after the 1979–1980 price shock, whereas the United States, United Kingdom, and Germany, which were less energy efficient, did.

In one example demonstrating the benefits of fuel diversity and higher levels of nonfossil energy, the Baker Institute studied the energy security benefits associated with the development of nuclear capacity in Japan. By examining past energy price fluctuations, the magnitude and probability of sudden price increases or supply shortages of imported oil and gas were simulated, along with the macroeconomic costs that result.² The Baker Institute study finds that a broad mix of fuels, including nuclear power, has helped Japanese consumers enjoy lower and more stable electricity costs than would have been possible without it, notwithstanding the recent problems with the nuclear power facilities in Japan. The study draws conclusions that have application to other sectors of the economy as well. Specifically, it concludes that a diversity of fuel sources increases flexibility to keep overall costs low during disruptions of any one fuel source. Having alternative choices also helps keep costs low in the face of more normal day-to-day fluctuations in fuel prices.³ This same lesson could be true with the development of a more diverse range of substitute fuels for automobiles.

² See P.R. Hartley and K.B. Medlock III, "The Role of Nuclear Power in Enhancing Japanese Energy Security," Baker Institute Study, October 2005, available at <http://www.rice.edu/energy>.

³ Ibid.

Recommendation 7: Avoid overly complex fuel policies to restrict carbon in the transportation sector, such as a national low carbon fuel standard (LCFS).

California has proposed a statewide low carbon fuel standard, which will limit over time a fuel producer's carbon emissions per unit of output. By imposing these GHG emission caps on sellers of fuel within the state, California hopes to stimulate near and long-term transitions to low-carbon alternative fuels and stimulate technological innovation in alternative fuel used in the state's automobile fuel system. This kind of low carbon fuel standard has also been proposed to be considered as a national policy.

The LCFS is unlikely to promote renewable energy because fuel providers, mainly refiners, are not in the electricity or car manufacturing/distribution business and, therefore, cannot switch to wind or solar power or similar alternatives as a means to meet the LCFS. Fuel providers will have limited options to reduce carbon emissions, and the easiest way to comply with the LCFS will be for refiners to reduce fuel sales in general, potentially causing serious shortages. The LCFS may also stimulate carbon-reducing "solutions" that are the most questionable in terms of their contribution to lowering emissions but are the most commercial and readily available—such as biofuels—without stimulating innovation as intended, since other promising technologies, such as plug-in hybrid cars, are ones that refining companies are not equipped to pursue. Moreover, those entities best suited to meet the LCFS, such as start-up technology companies, may not operate at the scale needed to meet specified targets.

Increased efficiency could better accomplish much of the intended goal of the LCFS, namely lower carbon dioxide emissions. Increased efficiency also benefits goals of energy security, whereas the LCFS may result in fuel shortages and limit substitutability, neither of which is beneficial to energy security.

Conclusion

The United States is not negotiating from a position of strength when it comes to oil, and our ability to affect directly the dynamics of international oil supply is weak. Despite the recent drop in gasoline prices, there are still many reasons to be concerned about a major supply disruption that could affect American mobility. Geopolitical factors could resurface to threaten the supply of oil from the Middle East, West Africa, or the former Soviet Union. In addition, destruction of oil production or fuel production and delivery infrastructure following a severe storm or natural disaster remains a high risk to U.S. gasoline supply. Unless it can forge a more effective policy response, the United States could—once the economy starts to grow again—return to being a prisoner of policy choices being made by major oil producing countries.



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SCIENCE AND TECHNOLOGY: RECOMMENDATIONS FOR THE NEXT ADMINISTRATION

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Overview

Science and technology (S&T) affect almost every area of policy including national security, the economy, health and safety, the environment, education, energy, and agriculture. There is a close relationship between S&T and the ability of the nation to meet economic, security, and social goals. This connection is clear to government leaders not only in the United States and other developed nations, but especially in China, India, and other countries of the developing world.

The discovery of new knowledge and technologies and their diffusion into the public domain drives innovation and contributes to sustainable economic growth and social well-being. Innovative applications of S&T create new industries and better jobs, increase productivity and fuel economic growth. Targeted research in universities and national laboratories contributes directly to the development of new sources of carbon-free energy and ways to use energy more efficiently; improved public health and affordable health care for all Americans; stewardship of the environment and the diversity of life on the planet; security of our homeland; the effectiveness of our educational systems; and the overall enhancement of the standard of living of people in the United States and throughout the world.

It is our view that President-elect Barack Obama should make S&T a higher priority than it has been in recent years. His decision in late December to name John Holdren as a science advisor with the rank “Assistant to the President” is an encouraging indication that White House policies will be based on evidence-based science. But there is still much work to be done. Specifically, the president-elect should:

- *Recommendation 1:* Insure that federal policy is grounded in the best scientific and technical information and advice.
- *Recommendation 2:* Enhance federally funded science and engineering research and development in high-priority areas.
- *Recommendation 3:* Mandate a comprehensive review of all federal programs in K-12 education and implement major reforms, particularly in the nation’s approach to science, technology, engineering, and mathematics education.

Background

Applications of the knowledge and tools that result from advances in S&T influence virtually every aspect of people's lives—how they live, work, communicate, stay healthy and happy—as well as public policy issues as diverse as energy, national security, and public health. To assure that the best policy decisions are made, it is essential that the best scientific and technical information and advice are available. This requires that scientists and engineers be willing to commit several years of their careers to public service. It also requires that the administration recruit outstanding qualified people to top positions in government and on federal advisory committees.

Our government's policy toward S&T also has important ramifications for industry and employment. U.S. science and engineering research has spearheaded innovation that has been a driving force for our economy since World War II. New products for market and powerful medical treatments and innovative technologies that lead to new jobs all come out of discoveries and inventions based on science and engineering R&D, often from universities. With the current economic downturn, many federal programs will struggle to keep their funding. Investing in R&D is not only an investment in the future sustainability of the country, but is also a means to help promote the innovation needed to improve our current economic situation and, in the case of purchases of equipment and construction of large facilities, contributes directly to business recovery and job creation.

But none of this will be possible unless the U.S. education system is reformed. The crisis in American K-12 education is well documented and has received considerable attention by many administrations. Nevertheless, it remains one of the most serious challenges facing this country. It will require new ideas and presidential leadership. Education in the United States is vital to creating a Science, Technology, Engineering, and Mathematics (STEM) workforce necessary to compete internationally. Not only will the nation need outstanding scientists and engineers to replace the Apollo generation of baby boomers, but it will also need workers in a broad spectrum of jobs who have technical knowledge and skills that greatly surpass those of earlier generations.

Recommendations

Recommendation 1: Insure that federal policy is grounded in the best scientific and technical information and advice.

“Science, like any field of endeavor, relies on freedom of inquiry; and one of the hallmarks of that freedom is objectivity. Now more than ever, on issues ranging from climate change to AIDS research to genetic engineering to food additives, government relies on the impartial perspective of science for guidance.”

—President George H.W. Bush, April 23, 1990.

Recommendation 1.1: Appoint a nationally respected scientific leader to be the president’s science advisor, with the rank “Assistant to the President for Science and Technology” and nominate that individual to be director of the White House Office of Science and Technology policy (OSTP) within the first month of the new administration.¹

We are encouraged by the president-elect’s decision in late December to name as scientific advisor John Holdren, a noted Harvard University physicist and winner of a "genius" grant from the MacArthur Foundation. Holdren will report directly to the president, another encouraging step. Below, we spell out what his role ideally should encompass:

Findings:

- The principal responsibilities of the science advisor are to:
 - Advise the president and others within the Executive Office of the President;
 - Lead an interagency effort to develop and implement sound science and technology policies, priorities and budgets in support of the president’s agenda;
 - Work with the director of the Office of Management and Budget (OMB) to convey priorities to the agencies;
 - Coordinate with the private sector to ensure that the federal policies and programs that relate to S&T contribute to the nation’s economic prosperity, sustainability, and national security;

¹ Based on recommendations from the National Academies report “Science and Technology for America’s Progress,” available at www.nap.edu and the Woodrow Wilson Center report “OSTP 2.0: Critical Upgrade,” available online at <http://www.wilsoncenter.org/news/docs/OSTP%20Paper1.pdf>.

- Build strong partnerships among federal, state and local governments, other countries, and the scientific community;
- Evaluate the scale, quality, and effectiveness over the long term of the national effort, public and private, in S&T.²
- Traditionally, the science advisor serves as director of OSTP, a Senate-confirmed position.
- As director of OSTP, the science advisor oversees the effectiveness of the federal R&D investment and reports, as requested, to Congress.

It is essential that the president's science advisor be a scientist (or engineer) of high standing within the technical professional community. The nation's leading scientists, engineers, and other professionals will need to be assured that the results of their research and the advice they provide to the government will be used appropriately for the benefit of the American people. The individual selected as science advisor should also be respected by policymakers and have a good understanding of how the federal government works, how large research or education enterprises are managed, and a sense of the most important national S&T policy issues (including but not limited to R&D). In addition, the science advisor should be able to effectively articulate important scientific and technical issues, including principles and ideals, discoveries, opportunities, and potential consequences, to the general public and policymakers.

The title "Assistant to the President," while not a statutory requirement for the position of science advisor, nevertheless is important, since having direct access to the president also insures that the science advisor will be included in all important discussions in the White House that deal with matters related to S&T. It also shows that S&T is a high priority for the new administration. Science advisors to former Presidents George H.W. Bush and Bill Clinton all held this title.

Furthermore, it is critically important that the president's science advisor be named early in the administration, preferably before inauguration day, so that he or she can be of assistance to the president in selecting the heads of several agencies that focus on S&T and developing the administration's agenda and priorities. The current science advisor, John Marburger III, was nominated in June and confirmed in October 2001, almost ten months after the administration

² The OSTP mission: http://www.ostp.gov/cs/about_ostp.

took office and following the 9/11 terrorist attacks. During the period between George W. Bush's inauguration and Marburger's confirmation, the administration made a number of important science policy decisions on topics from embryonic stem cell research to climate change and the environment. In addition, Marburger was not given the title "Assistant to the President."

Recommendation 1.2: Relocate the White House Office of Science and Technology to space within the Dwight David Eisenhower Executive Office Building.

Findings:

- It was tradition, until the George W. Bush Administration, that the offices of the science advisor (director of OSTP) and his or her staff be located in the Dwight David Eisenhower Executive Office Building, with easy access to most offices of the president, vice president, and their senior advisors;
- OSTP was moved to a location outside the White House complex after the terrorist attacks of September 11, 2001, just prior to Marburger's confirmation as director of OSTP.

The physical location of the science advisor and his or her OSTP staff is critically important to the effectiveness of the position. Advising the president also means working closely with the president's other senior policy advisors and councils—economic, national security, domestic, energy and environment, information technology—and their offices to ensure that they have the information they need on domestic and international policy matters in their purview. Since S&T are increasingly fundamental to every other area of policy, the science advisor and OSTP staff must have easy access to the other offices.

Recommendation 1.3: Nominate individuals to serve as heads of the federal agencies and offices involved in supporting R&D as well as the four associate directors of OSTP within the first two months of the new administration.

Findings:

- Agencies and offices that provide most of the federal government's R&D support include the National Science Foundation (NSF), the National Institutes of Health (NIH), the Department of Energy's Office of Science, the National Institute of Standards and Technology (NIST), the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautical and

Space Agency (NASA), the U.S. Geological Survey (USGS), and the Department of Defense Advanced Research Projects Agency (DARPA).

- OSTP is authorized to appoint up to four associate directors (all subject to Senate confirmation). The George W. Bush administration filled only two (S&T) associate director positions in OSTP.

Within the first month of the administration, if not before, the science advisor should develop a short list of candidates for the top S&T positions and four associate OSTP directors so that they can be appointed within the first two months of the new administration. The science advisor will likely already know many of these individuals and will be in an ideal position to evaluate their qualifications by consulting with leaders in the broad S&T community. These candidates should be well-respected scientists or engineers who have the confidence of the president as well as the staff of their agency or office.

The early Senate nominations of these individuals for these positions will help smooth the transition between administrations and provide an early start to move the president's agenda forward as it concerns S&T. And, with the early selection and Senate confirmation of four associate directors of OSTP, these important S&T officials will be able to help the science advisor select OSTP staff and move rapidly to address the president's S&T priorities and define how the agencies will work with the science advisor, OSTP, and OMB.

Recommendation 1.4: Appoint leaders in the science, engineering and technology community to serve on the President's Council of Advisors on Science and Technology (PCAST) within the first three months of the new administration.

Recommendation 1.5: Re-establish the cabinet level interagency National Science and Technology Council (NSTC), chaired by the President, within the first month of the new administration.

Findings:

- PCAST is an external presidential advisory committee that provides independent advice to the president on S&T matters and helps to evaluate federal S&T policy and programs.³
- PCAST was originally formed in 1990 by President George H.W. Bush, with the advice of his science advisor, Allan Bromley, to enable the president to receive advice from the private and academic sectors on technology, scientific research priorities, and mathematics and science education.
- PCAST, in recent years, has consisted of members who are nongovernment professionals, with the director of OSTP serving as chair or co-chair along with a committee member.
- In contrast to PCAST, NSTC is a government body, a cabinet-level council established in 1993 to coordinate S&T policy within the executive branch. Along with the director and associate directors of OSTP, NSTC coordinates interagency activities, and recommends program priorities and budget allocations for interagency federal S&T programs.⁴
- The members of the NSTC are cabinet secretaries and heads of the agencies (sometimes represented by their deputies) most involved in supporting R&D and, in principle, is chaired by the president. The work of the Council is carried out by a number of coordinating committees with representatives from all the relevant R&D agencies.

PCAST and NSTC are two important S&T advisory bodies available to the president on S&T policy matters. PCAST can offer the new administration high-quality advice and an independent view from the academic and private sector. They can also help the president and science advisor understand S&T trends, sharpen assessments of options and consequences, and advise them on the formulation of policies.⁵ We recommend that PCAST be in place within the first few months of the administration.

The administration should also re-establish NSTC. NSTC, a government body, is most effective in planning and coordinating the implementation of interagency S&T activities. In order to better coordinate the work of the agencies, NSTC needs to be empowered to influence agency priorities

³ PCAST information based on Web site: <http://www.ostp.gov/cs/pcast>.

⁴ NSTC information based on Web site: <http://www.ostp.gov/cs/nstc>.

⁵ Based on recommendations the Woodrow Wilson Center report “OSTP 2.0: Critical Upgrade,” available online at <http://www.wilsoncenter.org/news/docs/OSTP%20Paper1.pdf>.

and budgets. Substitutions at NSTC meetings should be limited to deputy secretaries or deputy heads of other agencies to emphasize the importance of their decisions.

Recommendation 1.6: Insure that the president's science advisor sits on all White House councils that relate to S&T matters.

The agencies and the science advisor (along with the OSTP and OMB staff) need to work as a “team” in support of the president’s agenda. Federal agencies are largely independent of one another, and the Congressional appropriations process often discourages cooperation. Better coordination of agencies’ activities across government is necessary, if an S&T agenda is to be elevated in the next administration. That can only happen if the president makes it a priority. By serving on all White House policy councils that have S&T issues (e.g. national security, economic, domestic and possibly energy and climate policy councils), the science advisor can be of assistance to other senior presidential advisors in developing policy options for the president’s consideration.

Recommendation 1.7: Issue an executive order directing federal agencies to restore the integrity of science in policymaking by insuring that all policies are based on the best evidence-based scientific information and expert advice.

Findings:

- In the 2004 report “Scientific Integrity in Policymaking,” the Union of Concerned Scientists documented several incidents that occurred during the George W. Bush administration, in which scientific findings and scientists’ opinions and advice were manipulated to serve a political agenda without regard for the potential impact of the results.⁶
- The report also highlighted individuals appointed to scientific advisory committees who had well-known biases or financial conflicts of interests, which created doubts about the objectivity of their advice.
- Furthermore, the report described instances where research findings and reports that did not support the administration’s political agenda were withheld from public view or altered at the behest of the White House or political appointees in several federal agencies, including the

⁶ Union of Concerned Scientists (UCS), 2004, “Scientific Integrity in Policy Making: An Investigation into the Bush Administration's Misuse of Science.” Cambridge, MA: Union of Concerned Scientists. February 18. An updated edition of this report, published in March 2004, is available online at <http://www.ucsusa.org/rsi>.

State Department, Environmental Protection Agency (EPA), and the Centers for Disease Control and Prevention (CDC). These actions affected how topics such as climate change, environmental risks, sexually transmitted diseases, birth control, and sex education were addressed by the administration and how scientific findings were described in government reports or on Web sites.

Americans expect their government to formulate policies and regulations based on the best available scientific and technical information. An executive order will insure that the agencies take appropriate steps to restore the integrity of evidenced-based science in setting policies and implementing programs: provide accurate scientific and technical information in government reports and on Web sites, appoint only the most qualified scientists and technical experts to scientific advisory committees without regard to their political views, and allow federal government scientists to speak out on matters within their areas of expertise.

Recommendation 2: Enhance federally funded science and engineering research and development in high-priority areas.

“Since the Industrial Revolution, the growth of economies throughout the world has been driven largely by the pursuit of scientific understanding, the application of engineering solutions, and continual technological innovation.”

—National Academies Report “Rising Above the Gathering Storm”⁷

Because of the recession that now threatens the welfare of millions of Americans, much attention is being given to economic stimulus and recovery. President Obama will set priorities for the upcoming budgets, advancing some initiatives and programs at the expense of others. We believe that increased investments in S&T R&D activities and infrastructure will contribute to the nation’s economic recovery as well as insure its long-term economic sustainability and security.

⁷ The National Academies, “Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future,” 2007. Available at www.nap.edu.

Recommendation 2.1: Increase science and engineering research budgets for agencies and programs singled out in the “America COMPETES Act” to achieve the ten-year doubling (beginning with FY2008) specified by the act, and for other agencies and programs that use merit review for their funding decisions.

Findings:

- U.S. federal investment in non-defense R&D (which is mainly research) as a fraction of GDP is predicted to drop to 0.4 percent GDP in 2008 from 0.7 percent GDP in 1970.⁸
- While the United States spends approximately \$140 billion—or 2 percent of its total annual budget—on R&D; most of this money is spent on development and testing of large weapons systems for the Department of Defense. Only \$56 billion (fiscal year 2007) is invested in research (basic and applied) conducted in universities, medical schools, and national laboratories.
- Over the past eight years, the NSF budget has seen only modest increases. From its peak in 2004, the NSF budget has declined in constant dollars every year since that time.
- The NIH budget is roughly half of the total federal investment in nondefense R&D. But, after seeing its budget double from 1998 to 2002, the NIH budget has received increases below the rate of inflation each year (from a 3.2 percent increase in fiscal year 2004 to a 0.0 percent projected increase in fiscal year 2009). In constant dollars, the NIH budget has actually decreased since 2005, after adjusting for inflation.
- The “America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act,” passed by Congress with strong bipartisan support and signed into law by President George W. Bush in 2007, authorized a doubling of NSF by 2011 and DOE’s Office of Science in ten years. Furthermore, it approved a NIST increase to \$937 million from \$703 million by 2011. But none of the increases in funding were appropriated in fiscal year 2008 and 2009 budgets.

Clearly, increases in agency budgets, especially during a time of economic crisis and fiscal constraints, will receive a high level of scrutiny. We believe that increased investments in S&T are in the best interest of the nation’s economic recovery and sustainability. Peer review is the best mechanism to insure these funds are spent wisely. The doubling of the research budgets for

⁸ American Association for the Advancement of Science (AAAS), <http://www.aaas.org>.

agencies highlighted in the “America COMPETES Act” (NSF, DOE’s Office of Energy Research and NIST) involves appropriating a 14 percent increase for FY2009 followed by 7 percent annual increases over a decade. Other agencies and programs that use merit review for their funding decisions, including NIH, should be considered for similar growth. These increases are prudent investments that are likely to pay big dividends in both the short and long run. The additional funding would lead to significantly improved grant funding rates ideally to a level above 25 percent. Furthermore, it would make optimal use of the intellectual capital that has been developed in universities and national laboratories.

Because future budgets are unpredictable, the administration should require all agencies to have contingency plans in place to soften the impact in case future budget increases are not realized. Such planning should be a central part of each annual budget request.

Recommendation 2.2: Place a high priority on increasing funding for early-career research; high-risk, high-reward (potentially transformational) research; and give increased attention to international collaborations.

“Ninety-nine percent of the discoveries are made by one percent of the scientists.”

—Julius Axelrod, Nobel Laureate⁹

Findings:

- Many agencies have difficulty cultivating and rewarding new investigators. From 1980 to 2006, the average age for the first grant at NIH increased from 37.2 to 42.4, while faculty positions in medical schools more than doubled (medical schools receive approximately 55 percent of NIH’s research funding).¹⁰ At NSF, it is estimated that the average age for a first award is 39 to 40.¹¹
- NSF defined “transformational research” as “research driven by ideas that have the potential to radically change our understanding of an important existing scientific or engineering concept or leading to the creation of a new paradigm or field of science or engineering. Such

⁹ Julius Axelrod, in the Proceedings of the American Philosophical Society, Vol. 149, No. 2, June 2005.

¹⁰ Data available from NIH on their Web site: www.nih.gov.

¹¹ NSF 2006 Survey of Doctoral Recipients, www.nsf.gov/statistics/srvydoctoratework/.

research also is characterized by its challenge to current understanding or its pathway to new frontiers.”¹²

- The American Academy of Arts and Sciences release a report in 2008 titled “Advancing Research in Science and Engineering (ARISE): Investing in Early-Career Scientists and High-Risk, High-Reward Research,” which listed recommendations on how to help promote early-career faculty and promote high-risk (potentially “transformational”) research projects in an effort to nurture young scientists.¹³

Young scientists increasingly face long graduate and post-doctoral training periods before having an opportunity to establish independent careers. They also experience significantly lower funding rates than more veteran investigators and, hence, must spend more time preparing additional grant proposals. Furthermore, agencies have trouble funding truly daring and high-risk ideas, where the opinions of expert reviewers are often mixed. When funding is limited, reviewer decisions tend to be conservative. Projects that are innovative, but unconventional, usually get put aside in favor of low-risk projects with more predictable results and new investigators lose out to more established researchers. While science often proceeds in incremental steps, unexpected breakthroughs, resulting from bold paradigm shifts, and projects challenging accepted ideas, make the biggest contributions to new innovations. But regardless of the budget levels, additional funding should be provided to improve funding of early-career investigators and high-risk, high-reward (“transformational”) projects.

PCAST could be tasked to assess how agencies are encouraging early-career researchers and high-risk, potentially transformational projects and recommend steps the agencies should take to give higher priority to these areas. Recommendations from the ARISE report include creating large, multi-year awards for early-career faculty and considering targeted programs, grant mechanisms, and policy to foster transformative research.

¹² Quote from National Science Board briefing by NSF, “Enhancing Support of Transformative Research at the National Science Foundation,” August 10, 2007, http://www.nsf.gov/nsb/documents/2007/tr_report.pdf.

¹³ Based on recommendations from the American Academy of Arts and Sciences report, “ARISE: Investing in Early-Career Scientists and High-Risk, High-Reward Research.”

In addition, while international research projects are encouraged by several agencies, particularly in cases where partners are desirable to share costs of large facilities, overall international collaborations have not been a particularly high priority. With the rapid growth of research budgets and expertise, particularly in parts of Asia and South America, it will be increasingly important—indeed in our own self interest—to encourage collaborations between U.S. researchers and their foreign counterparts. PCAST could be tasked to review international collaborations across the federal government and make recommendations to the president. The National Science Board could also contribute a valuable perspective on this matter.

Recommendation 2.3: Create a set of “Presidential Grand Research Challenges” and interdisciplinary federal research budget initiatives focused on specific national needs in the first year of the administration.

Findings:

- Grand challenges have proved helpful in past administrations to focus interagency research activities on national goals.
- For instance, the “Grand Challenges in Global Health” created in 2003 and funded by the Bill and Melinda Gates Foundation revolutionized and prioritized biomedical research for the developing world.¹⁴

The science advisor, working with the agencies through NSTC should be charged to develop for the president a number of options for “grand research challenges.” The challenges should be interdisciplinary and interagency research efforts that are focused on vital national needs.

Possible areas include

- Efficient energy storage and transmission,
- Carbon-free energy production,
- National health disparity,
- Sustainable development,
- Carbon sequestration,
- Adaptation to climate change,

¹⁴ The Bill and Melinda Gates Foundation Grand Challenges for Global Health: <http://www.gcgh.org>.

- Innovation and emerging technologies (e.g. nanotechnology, synthetic biology, next-generation computing, and communication) and
- Renewal of the nation's infrastructure (e.g. new transportation systems).

This focus on interdisciplinary and interagency grand challenges should not preclude disciplinary “grand challenges” in such fields as high-energy elementary particle physics, astronomy and particle astrophysics, geosciences, life sciences, materials science, computing and communications, and fields of engineering. Proposals for these initiatives, which often involve large shared facilities, should be sought from the respective research communities and reviewed by the R&D agencies.

PCAST could be asked for early advice on grand challenges and also tasked to review options developed by the science advisor, as was done when President Clinton was considering his National Nanotechnology Initiative.

*Recommendation 2.4: Remove restrictions on federal funding of stem cell research.*¹⁵

*Recommendation 2.5: Carry out a comprehensive review of U.S. space policy and the status of NASA planning.*¹⁶

Recommendations 2.4 and 2.5 address two areas of science policy that were heavily impacted by the Bush Administration: 1) strict limitations of human embryonic stem cell research and 2) the U.S. space program and NASA's de-emphasis of science. Visit the Baker Institute's Policy Recommendations page for more information at <http://www.bakerinstitute.org/front-page/news/policy-recommendations-for-the-next-administration>.

¹⁵ Kirstin Matthews and Neal Lane, “Human Embryonic Stem Cell Research: Recommendations for the Next Administration” at www.bakerinstitute.org

¹⁶ George Abbey and Neal Lane, “Space Policy: Recommendations for the Next Administration,” *in progress, to be posted at* www.bakerinstitute.org.

Recommendation 3: Mandate a comprehensive review of all federal programs in K-12 education and implement major reforms, particularly in the nation’s approach to science, technology, engineering and mathematics education.

“If you can solve the education problem, you don’t have to do anything else. If you don’t solve it, nothing else is going to matter all that much”

—Alan Greenspan, Federal Reserve Board Chairman.

Disadvantaged by today’s U.S. K-12 educational system, the average American simply does not know enough mathematics and science to be able to effectively contribute to changing technological workforce that requires continued learning. Meanwhile, nations like China, India, and other countries in the developing world are focusing their resources on education and training with the hope of leapfrogging the United States in the global market, the “flat world” of author Thomas Friedman. All studies of the U.S. educational challenges make clear that major reforms are needed and that there is no single solution. It is a complex problem requiring attacks on several fronts.

Progress in qualitatively improving K-12 education in the United States will require bold ideas and major reforms, far beyond what have been attempted in the past. Serious consideration should be given to funding multidisciplinary research, including large-scale experiments, to better understand how technology can be used to improve student learning. For this, we recommend PCAST study the issue and make recommendations for innovative and daring projects to improve the system.

Recommendation 3.1: Increase the numbers of well-trained K-12 teachers in science and mathematics and provide support for their continuing education and retention in the profession.

Findings:

- In 1999, 68 percent of U.S. 8th grade students received instruction from a mathematics teacher who did not hold a degree or certification in mathematics.¹⁷

¹⁷ National Science Board, “Science and Engineering Indicators 2004,” <http://www.nsf.gov/statistics/seind04/>.

- In 2000, 93 percent of students in grades 5–9 were taught physical science by a teacher lacking a major or certification in the physical sciences (chemistry, geology, general science, or physics).¹⁸

The National Academies report “Rising Above the Gathering Storm” highlighted K-12 education as one of the nation’s top priorities.¹⁹ The report recommended that the federal government provide funding for scholarships to university mathematics and science majors who are willing to teach mathematics and science after graduation. It also recommended supporting continuing education programs to strengthen the skills of current mathematics and science teachers. This could be done through summer institutes, masters programs, and Advance Placement (AP) and International Baccalaureate (IB) training programs, all of which have been shown to be effective. By training and educating thousands of teachers and giving them the necessary tools to teach STEM programs, millions of students can be impacted. Although these steps are not revolutionary, past experience makes results virtually guaranteed.

Recommendation 3.2: Insure that every student who graduates from an American high school possesses a good understanding of mathematics, the life and physical sciences, as well as engineering and technology, according to a set of mandatory national standards.

“America’s high schools are obsolete. By obsolete I don’t just mean that our schools are broken, flawed, and under-funded—though a case could be made for every one of those points. By obsolete, I mean that our high schools—even when they’re working exactly as designed—cannot teach our kids what they need to know today This isn’t an accident or flaw in the system; it is the system.”

—Bill Gates, former CEO of Microsoft and Chairman of the Bill and Melinda Gates Foundation

¹⁸ National Center for Education Statistics. Schools and Staffing Survey, 2004, “Qualifications of the Public School Teacher Workforce: Prevalence of Out-of-Field Teaching 1987–88 to 1999–2000 (revised).” 2004.

¹⁹ The National Academies, “Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future,” 2007, www.nap.edu.

Findings:

- Less than one-third of U.S. 4th grade and 8th grade students performed at or above a level called “proficient” in mathematics.²⁰
- U.S. fifteen-year-olds ranked 24th out of forty countries that participated in a 2003 administration of the Program for International Student Assessment (PISA) examination, which assessed students’ ability to apply mathematics concepts to the real-world.²¹

Another aspect of empowering teachers to teach well is the curriculum. In order to be successful in this increasingly knowledge-based world, a fundamental understanding of science and mathematics is absolutely essential. High school graduates who do not have this knowledge and skills are seriously disadvantaged in seeking good jobs and advancing their fields. This implies, at the very least, the need for a uniform set of national mathematics and science standards. These standards should highlight the scientific method and inquiry-based education as well as the basic principles and theories in the natural sciences (i.e. biology, chemistry, physics, and earth sciences) and important aspects of engineering and technology. Ideally, every school—public and private—should be required to adopt these standards. We believe it is in the national interest that everyone who lives and works in this country have a basic understanding of the physical and biological natural world around them and possess the mathematical and technical skills they will need to be productive and involved citizens.

The continued rapid development of computing and the Internet has made possible new powerful approaches to teaching by employing modern information technology. One example is the online mathematics-teaching tool “Reasoning Mind,”²² which was highlighted in the recent report on Texas education by The Academy of Medicine, Engineering, and Science of Texas (TAMEST).²³

²⁰ National Center for Education Statistics. 2006, “The Nation’s Report Card: Mathematics 2005,” <http://nces.ed.gov/nationsreportcard/pdf/main2005/2006453.pdf>.

²¹ National Center for Education Statistics, “International Outcomes of Learning in Mathematics Literacy and Problem Solving: PISA 2003 Results from the US Perspective.” 2005.

²² Reasoning Mind information available online at <http://www.reasoningmind.org/>

²³ TAMEST, “The Next Frontier: World-Class Math and Science Education for Texas” December 2008, online at <http://tamest.org/education/>

NSF has a mandate to support activities that seek to improve teaching and learning in STEM areas. In addition to the work of NSF, other federal agencies should be encouraged to give higher priority to K-12 education. For example, DOE, DOD, NASA, and NOAA and others could develop stronger partnerships between the R&D laboratories, centers, and institutes they support and schools in their region. Many such ongoing activities are impressive. Much could be done with encouragement by the president and coordination by the science advisor and NSTC.

Recommendation 3.3: Increase funding for student fellowships and advanced degree programs in science, engineering and medicine.

Recommendation 3.4: Lower or remove barriers that prevent scientists and engineers, who are born abroad, as well as foreign-born young people who wish to become scientists or engineers, from coming to the United States.

“If you want good manufacturing jobs, one thing you could do is graduate more engineers. We had more sports exercise majors graduate than electrical engineering grads last year.”

—Jeffrey R. Immelt, Chair & CEO, General Electric.

Findings:

- In 2004, there were half as many bachelor degrees in physics awarded than in 1956, the last graduating class before Sputnik.²⁴
- More S&P500 CEOs obtained their undergraduate degrees in engineering than any other field.²⁵
- 86 percent of U.S. voters believed that the United States should increase the number of STEM workers so that we can compete internationally.²⁶
- In the STEM workforce, 38 percent of Ph.D. graduates in 2000 were foreign-born.²⁷

²⁴ National Center for Education Statistics, “Digest of Education Statistics 2004.”

²⁵ S. Stuart, “2004 CEO Study: A Statistical Snapshot of Leading CEOs.” 2005.

²⁶ The Business Roundtable, “Innovation and U.S. Competitiveness: Addressing the Talent Gap. Public Opinion Research.” January 12, 2006.

²⁷ The National Academies, “Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future,” 2007. Available online at www.nap.edu.

- Barriers include visa restrictions and process, as well as export-control policies that make it difficult for foreign-born research students to use standard equipment available to U.S. citizens.

In order for the United States to continue to be a world leader in S&T, it must encourage the nation's young people to seek advanced education and training in preparation for careers in science and engineering. The next administration should encourage students to pursue careers in science and engineering by funding additional scholarships and fellowships for undergraduate and graduate students. These programs should be designed to produce students who are trained for a variety of careers outside of academia.

Moreover, barriers should be lowered to allow more foreign students who wish to study in this country and professional scientists and engineers who wish to develop their careers here. It has become increasingly clear that the nation's leadership in S&T depends to a large extent on talent from abroad. But, with growing opportunities elsewhere, many of the best students and professionals are going to Europe or other parts of the world or staying in their home countries to study and work. To attract and retain these talented scientists and engineers, the next administration will need to improve the visa approval process for international students, increase the number of foreign scientists and engineers who are allowed to immigrate to America, and revise the export control regulations. The administration should consider implementing an automatic one-year visa extension on all science and engineering doctorates to help retain them in the United States. These and other recommendations are contained in the National Academies' "Rising Above the Gathering Storm" report.

Conclusion

Science and technology impact most areas of public policy including domestic and national security, energy and climate change, the environment, health and safety, agriculture, transportation, education and, of most immediate concern, the economy and jobs for Americans. From federal investments in science and engineering R&D, we obtain new knowledge and technologies that improve the ability of our nation to meet its economic, security, and social

goals. In the United States, scientific discoveries and technological breakthroughs have been shown to drive innovation, which plays a vital role in sustainable economic growth.

The first few months of the Obama administration will provide a unique opportunity to set the nation on a progressive track to advance American S&T and applications to societal goals. That will require that the administration's S&T team, consisting of presidential appointees in the agencies and advisors in the White House, be in place very early in the administration. The early appointment of the president's science advisor is particularly important, so that the president will have access to all the necessary information as he makes early decisions about priorities and budgets for the agencies and programs. Particular attention should be given to research funding, which has lost ground to inflation for many years, and to STEM education, a continuing national crisis.



JAMES A. BAKER III INSTITUTE FOR PUBLIC POLICY
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NEEDLE EXCHANGE PROGRAMS: RECOMMENDATIONS FOR THE NEXT ADMINISTRATION

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Overview

No responsible person wants to encourage drug abuse. No fiscally prudent person wants to waste money simply to satisfy a sense of righteous indignation. No compassionate person wants to consign people unnecessarily to death or a living hell. Fortunately, providing injecting drug users with access to sterile syringes allows us to be responsible, prudent, and compassionate—admirable criteria for good public policy.

1. Remove the ban on the use of federal funds to programs and projects that provide sterile syringes to injecting drug users as a proven means of reducing the spread of blood-borne diseases such as HIV/AIDS and hepatitis C.
2. Authorize federal funding and encourage other forms of governmental and nongovernmental funding for programs that increase the availability of sterile syringes to injecting drug users.
3. Allow funds from the President's Emergency Plan for AIDS Relief (PEPFAR) to be used to provide sterile syringes to injecting drug users.

Background

The United States has a serious blood-borne disease problem. Injecting drug users account for a substantial proportion of this problem. By 2002, according to the Centers for Disease Control and Prevention (CDC), 36 percent (270,721) of AIDS cases in the United States had occurred among IDUs, their sexual partners and their offspring; 28 percent of new cases were traceable to IDUs. The proportion appears to be shrinking somewhat; in 2006, approximately 20 percent of new cases were attributable to IDUs. Hepatitis C is also rampant among IDUs in this country; surveys consistently find that between 50 and 80 percent of injectors contract the virus within the first year of needle use and that it is found in the blood of even higher proportions (70–90 percent) of all adult IDUs.

Needle Exchange Programs

Medical care for infected persons is enormously expensive. A 2005 CDC report estimated that the current lifetime treatment cost of a person with HIV is \$210,000. At current rates, approximately 40,000 people are infected with HIV each year. Treating just those who have been infected in the last five years for the rest of their lives, using the CDC figure, will cost an estimated \$42 billion. Other well-founded cost estimates are far higher. Treatment for hepatitis C can run to \$20,000 to \$30,000 per year, with lifetime costs of more than \$300,000 for a population six times greater than people living with HIV and AIDS. A high proportion of these costs is borne by Medicaid and other government-funded programs.

Other countries have demonstrated the benefits of needle-exchange programs (NEPs). A ten-year government assessment of an Australian public health program of syringe exchange estimated that NEPs had resulted in the avoidance of 25,000 cases of HIV and 21,000 cases of hepatitis C over the decade of the 1990s. In the year 2000, there were 14.7 new AIDS cases for every 100,000 Americans, compared to just 1.1 new AIDS cases for every 100,000 Australians. Hundreds of needle exchange programs operate in Europe, Canada, China, Malaysia, various Latin American countries, and even in Iran, which has a growing AIDS epidemic. Repeated scientific assessment attests to the positive role NEPs can play in reducing the spread of blood-borne diseases.

Recommendations

Recommendation 1: Remove the ban on the use of federal funds to programs and projects that provide sterile syringes to injecting drug users as a proven means of reducing the spread of blood-borne diseases such as HIV/AIDS and hepatitis C.

In 1997, Congress passed Public Law 105-78, Sec. 505, 506, which prohibited federal funding of “any program of distributing sterile needles or syringes for the hypodermic injection of any illegal drug,” but contained the qualification that, if the secretary of Health and Human Services were to determine that NEPs can be effective in preventing the spread of AIDS and did not encourage illicit drug use, the ban could be lifted.

Key governmental and professional bodies, including the National Academy of Science, the Centers for Disease Control, the American Medical Association, the Institute of Medicine, the National Institutes of Health, the American Public Health Association, and the American Bar Association have conducted studies and issued reports on the topic of access to clean needles.

Without exception, these studies and organizations have endorsed access to clean needles as an effective measure for reducing the incidence of blood-borne diseases and increasing access to treatment for drug users. A 2004 study by the World Health Organization compiled the results of more than 200 assessments from around the world and reached similar conclusions.

Surgeons General C. Everett Koop and David Satcher, National Institutes of Health Director Harold Varmus, Secretary of Health and Human Services Donna Shalala, and former National Institutes of Health Director Elias Zerhouni have all issued statements in agreement with these findings.

Given the overwhelming scientific evidence, the conditions for lifting the ban imposed by Public Law 105-78 have been met.

Recommendation 2: Authorize federal funding and encourage other forms of governmental and non-governmental funding for programs that increase the availability of sterile syringes to injecting drug users.

Approximately 200 NEPs currently operate in the United States. Some are legal; some are not. Some do little more than exchange needles, while others provide various ancillary services and make significant efforts to link addicts to treatment programs.

Although they save far more money than they cost, needle-exchange programs do cost money—for staff, facilities, utilities, and, of course, for needles and other items dispensed to clients. Some programs are well funded; many, perhaps most, operate on shaky financial ground. Lack of federal money and reliance on volunteer staffers make their existence precarious.

Funding NEPs is economically sound. Many people infected with these diseases receive little or no medical treatment, but of those who do, Medicaid or other public funds bear a high proportion of the cost. The net savings for each case of HIV prevented is approximately \$300,000, with a similar figure for each case of hepatitis C prevented. Preventing just one case of either disease would save far more than the annual cost of a first-rate needle-exchange program.

Recommendation 3: Allow funds from the President's Emergency Plan for AIDS Relief (PEPFAR) to be used to provide sterile syringes to injecting drug users.

Despite the scientific evidence, PEPFAR has not funded NEPs, even in countries where IDUs account for a much larger proportion of HIV/AIDS cases than in the United States. In some areas, including Russia and its former satellite countries and significant parts of Asia, injecting drug use is believed to be the primary cause of an explosive growth in HIV infections.

All of the arguments listed above apply at least as strongly to funding of NEPs under PEPFAR. In addition, since people in many of the affected countries have little chance of receiving the kind of treatment available in the United States, prevention is even more important.

Conclusion

Though some sincerely question the scientific evidence supporting various forms of needle exchange, the major opposing argument continues to be, "It sends the wrong message." Before we accept that rationale, we need to think about the message sent by opposition to needle exchange: "We know a way to dramatically cut your chances of contracting a deadly disease, then spreading it to others, including your unborn children. It would also dramatically cut the amount of money society is going to have to spend on you and those you infect. But because we believe what you are doing is illegal, immoral, and sinful, we are not going to do what we know works. You are social lepers and, as upright, moral, sincerely religious people, we prefer that you and others in your social orbit die."

Needle Exchange Programs

Providing injecting drug users with access to sterile syringes allows us to be responsible, prudent, and compassionate—admirable criteria for good public policy.

Read William Martin’s “Policy with a Point” 2009 research paper on the Baker Institute Web site for a fuller discussion of this topic at <http://www.bakerinstitute.org/publications/DRUG-pub-MartinNeedleExchangeUpdate-011609.pdf>.



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HUMAN EMBRYONIC STEM CELL RESEARCH: RECOMMENDATIONS FOR THE NEXT ADMINISTRATION

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Human Embryonic Stem Cell Research

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Overview

Stem cell research should be allowed to expand in a responsible, thoughtful and ethical manner and a comprehensive federal stem cell policy should be developed that includes ethical oversight of all such research, regardless of who pays for it and where it is done. This paper seeks to describe and explain recommendations for the next administration in the context of the current state of the science, existing stem cell policy, and public opinion in the United States.

Recommendation 1: Expand federal funding for human embryonic stem cell research.

- 1.1. Support research on all types of human stem cells, including embryonic, adult, nuclear transfer derived (also known as therapeutic cloning) and induced pluripotent derived.
- 1.2. Authorize federal funding of human embryonic stem cell research on lines derived according to strict ethical guidelines, regardless of the date the cell lines were derived or created.
- 1.3. Remove the Dickey Amendment (which severely limits the National Institutes of Health funding of embryonic research) from the Department of Health and Human Services appropriation bills.

Recommendation 2: Create a comprehensive federal stem cell research oversight policy with the National Institutes of Health taking the lead.

- 2.1. Ban any effort to clone a human being, regardless of the source of funding.
- 2.2. Create an Embryonic Stem Cell Research Oversight (ESCRO) board within the National Institutes of Health to review controversial research and recommend policy for the agency.
- 2.3. Continue the President's Council on Bioethics.

Background

Human embryonic stem cell (hESC) research is an emerging field of biomedical research that started in 1998 with the derivation of the first cell line. These cells, created from a five- to six-day-old fertilized egg are called “pluripotent” because they have the potential to replicate themselves for indefinite periods and to produce cells of a more specialized type, such as a muscle or neuron. Scientists are confident that hESCs can potentially advance research in areas as diverse as developmental biology, cancer research, and regenerative medicine. Advocates predict that hESCs will be used to produce tissues or organs to replace damaged ones, to understand and combat diseases, and to test and develop new drugs. Adult stem cells also have medical promise. But, in contrast to adult stem cells, which are specialized to particular tissues or organs, hESCs have the potential to specialize into any cell in the body and therefore have the capability to be utilized in tissues and organs where stem cells are missing or damaged.

Stem cell research has helped scientists begin to see the potential for near term therapies. Biotechnology companies are working on clinical trials for therapies such as repairing spinal cord injuries, where other approaches have made little progress. In addition, hESCs have been hypothesized as a new source of clean, universal blood. Scientists are optimistic that in the future hESCs can be used to better understand and treat debilitating diseases such as juvenile diabetes, Parkinson’s disease, and cancer. Furthermore, researchers have used the knowledge gained from research on hESCs to help develop “induced” pluripotent cells (iPS), which are normal cells that have been stimulated and reprogrammed to become embryonic-like again. Induced pluripotent cells could lead to advances in personalized medicine, with the goal of future medical care being tailored to an individual’s genome, thus avoiding unintended consequences of drugs and other treatments that work for some, but not for others. While hESC research is starting to break new ground, further studies need to be done to better understand how these cells work and how they can be used before research results can be applied to treatment or therapies.

With this exciting and potentially powerful new area of research also came significant controversy due to concerns about the source of hESCs—a human fertilized egg. Progress in the United States has been severely limited by the lack of federal funding and oversight. In 2001,

President George W. Bush ordered that federal funding would only be permitted for research on hESCs that were created before August 9, 2001. No new hESCs could be created with federal funding, nor could federal funds be used to perform research on hESCs created after August 2001, whatever their source. Based on this policy, only 21 cell lines were available for federally funded research. But this policy only controls federal funding. So, research using state and private funds continues with minimal federal oversight and regulation (only regulations related to clinical uses by the Federal Drug Administration (FDA) apply).

During his administration, President Barack Obama should revisit the 2001 decision that limits federal funding and regulation of hESC research. He should also promote public policy and federal stem cell policy that expands research in a responsible, thoughtful and ethical manner, while laying a foundation for future scientific advances.

Recommendations

Recommendation 1: Expand federal funding for human embryonic stem cell research.

Public support for expanded federal funding of hESC research has increased over the past seven years. Research!America polling in 2006 showed that 60 percent of people polled supported hESC research and 56 percent supported federal funding of the research.¹ Other polls from Gallup, Inc., and Virginia Commonwealth University have seen support of hESC at 60 and 54 percent respectively.²

In response to growing public support, the U.S. Congress attempted to expand hESC research by passing the Stem Cell Research Enhancement Act with bipartisan support in 2006 and 2007. The bill, which was vetoed both times by President George W. Bush, would have allowed federal funding of research on hESC lines that were created using leftover *in vitro* fertilized (IVF) eggs regardless of the date of derivation. RAND Corporation estimated that in 2003 there were more than 400,000 such leftover *in vitro* fertilized (IVF) eggs, which are otherwise discarded.

¹ Research!America data is available online at www.researchamerica.org.

² Gallup's Pulse of Democracy, Stem Cell Research: <http://www.gallup.com/poll/21676/Stem-Cell-Research.aspx>; and Virginia Commonwealth University Life Sciences Survey, 2007: <http://www.vcu.edu/lifesci/images2/survey2007.pdf>

Recommendation 1.1: Support research on all types of human stem cells, including embryonic, adult, nuclear transfer derived (also known as therapeutic cloning), and induced pluripotent derived.

Findings:

- Stem cells can be located in the embryo during the early stages of development (around five or six days after fertilization), in the umbilical cord and placenta, and in several adult organs.
- Embryonic-like stem cells can be created by stimulating normal cells to revert back to an earlier form—known as induced pluripotent stem cells or iPS cells—or by removing the genetic material from an egg and replacing it with the genetic material from a normal cell—known as somatic cell nuclear transfer (SCNT) or therapeutic cloning.
- Induced pluripotent stem cells are not yet a feasible replacement for all hESCs. The process by which iPS cells are created might, in fact, alter the cells so they are not viable for therapeutic research. And without hESCs, we cannot determine if the iPS cells have undergone any potential undesirable changes.
- Each type of stem cell is valuable in different areas of research. For instance hESCs can be an important tool for understanding early human developmental biology, perhaps elucidating issues involved in infertility and birth defects, while iPS or SCNT derived cells could further understanding of the development of specific diseases such as Parkinson's or Alzheimer's.
- Current federal funding only supports umbilical cord, adult, very limited embryonic stem cell research, and research with iPS cells. SCNT derived cells and hESCs created after Aug. 9, 2001, cannot be used in federally funded research.
- In fiscal year 2008, NIH spent \$41 million on hESC and an additional \$203 million on non-embryonic human stem cell research from its \$29.5 billion budget, while California alone predicted it would spend \$100 million during the same time.

The United States needs a new progressive stem cell policy that will increase federal support of all human stem cell research. By encouraging research on all types of human stem cells, we will allow the best research to move forward regardless of the cell source. Research on all human stem cell types is also essential to develop future therapies and cures for debilitating diseases and

injuries such as diabetes, spinal cord injuries or Parkinson's, which impact millions of Americans.

Recommendation 1.2: Authorize federal funding for human embryonic stem cell research on lines derived according to strict ethical guidelines, regardless of the date the cell lines were derived or created.

Findings:

- When the Bush administration's policy was announced in 2001, the National Institutes of Health (NIH) declared that there were 60 to 75 lines that met the qualifications for federal funding. Since that announcement, only 21 lines were found to be available for distribution.
- In using these lines, scientists have come across additional problems.
 - All 21 lines were created using mouse cells and reagents to help support growth, which means that the cells could be contaminated with mouse cells or proteins. This could potentially limit their use for medical purposes.
 - Several of the lines have proven difficult to grow.
 - Each line has a propensity to grow into specific cell types, which restricts research.
 - The cell lines lack genetic diversity, which could limit potential treatments for a broad number of patient communities.
 - None of the cell lines are disease-specific, thereby limiting research on genetic diseases.
 - Of the 21 lines, five are suspected to have been obtained without appropriate informed consent.³
- To counteract the limited funding situation, some universities, including Harvard and the University of Wisconsin–Madison, were able to obtain private funding for their research. Other researchers were able to convince state legislatures and governments such as California, Illinois, and Connecticut, to fund projects. But many researchers were left

³ Steiffer, R. "Informed Consent and Federal Funding for Stem Cell Research," Hasting Center Report 38, No. 3 (2008): 40-7.

without readily available funding sources outside of NIH, the major funding source for biomedical research in the United States.

- Over the past seven years, while research on adult stem cells has surged in the United States, hESC research has stagnated compared with other parts of the world.
 - From 2002 to 2004, the fraction of hESC research publications from American researchers decreased from one-third to approximately one-quarter.⁴
 - Recent research from Georgia Institute of Technology confirmed that the United States is underperforming in hESC research.⁵ The report found that American researchers produce fewer publications than would be predicted based on other areas of biomedical research.

The next administration should permit NIH to provide funding for: (a) research on hESCs regardless of when they are derived and who derives them, (b) the derivation of new hESC lines, e.g., from discarded embryos from IVF clinics, and (c) SCNT derived stem cell lines. Using these lines, scientists will be able to study genetic diseases more quickly and efficiently, and hopefully even discover new therapeutic techniques that will, in the future, avoid the need for hESC lines.

Recommendation 1.3: Remove the Dickey Amendment (which severely limits the National Institutes of Health funding of embryonic research) from the Department of Health and Human Services (DHHS) appropriation bills.

Findings:

- Starting in 1995, the Dickey Amendment, named after an appropriation rider introduced by Rep. Jay Dickey (R-AZ), has been attached to DHHS appropriation bills each year.
- The amendment bans any federal funding for “the creation of a human embryo or embryos for research” and “research in which a human embryo is destroyed, discarded, or knowingly subjected to risk of injury or death.”

⁴ University of Michigan, *U.S. falling behind in embryonic stem cell research, study says*, Press Release, April 2006, <http://www.umich.edu/news/index.html?Releases/2006/Apr06/r040606b>.

⁵ Levine, A.D. “Identifying Under- and Overperforming Countries in Research Related to Human Embryonic Stem Cells.” *Cell Stem Cell* 2 (2008): 521-4.

In the future, any federal restriction on the use of human embryos for research should be passed as a bill, signed into law, not as a rider on an annual appropriations bill. This approach would allow for appropriate discussion and informed debate on the subject. It will also stabilize the policy instead of leaving it in its current ambiguous state, where researchers are unsure if the amendment will continue to appear year to year. President Obama should veto any DHHS appropriation bill that contains the Dickey Amendment or similar rider.

Recommendation 2: Create a comprehensive federal stem cell research oversight policy with the National Institutes of Health as the lead.

Recommendation 2.1: Ban any effort to clone a human being, regardless of the source of funding.

Findings:

- Human reproductive cloning is the process of creating a human being that is the exact genetic copy of the donor.
- In contrast, therapeutic cloning (also known as SCNT)—which should not be banned—refers to a process in which the cells are grown *in vitro* (outside the body, in a lab), not *in utero* (in a woman's uterus) to produce an infant.
- Attempts at reproductive cloning for animals have been error-prone and inefficient, resulting in the failure of most clones to develop. Those that do survive have a marked shorter life expectancy.
- Human reproductive cloning has been denounced by both scientists and policymakers around the world. Polling from Research!America found that between 77 percent and 83 percent of Americans oppose human reproductive cloning.⁶
- Fourteen states and over 40 countries have already banned human reproductive cloning.

For these reasons, the United States should ban human reproductive cloning—both in the public and private sectors.

⁶ Research!America data is available online at www.researchamerica.org.

Recommendation 2.2: Create an Embryonic Stem Cell Research Oversight (ESCRO) board within the National Institutes of Health to review controversial research and recommend policy for the agency.

Findings:

- Oversight of hESC research during the George W. Bush administration was left to the universities and research institutes as well as private industry.
- In the past, for previous controversial areas of biomedical research, NIH would play a strong leadership role in creating research policy. For example, the Recombinant DNA Advisory Committee (RAC) was created to review proposals involving the use of DNA in research and clinical therapies.
- Since the majority of hESC research was performed without federal funding, NIH was not involved in the oversight. But, the public would support an increase in its role; Research!America polling showed that approximately two-thirds of Americans agree that there should be a uniform federal hESC policy.⁷
- Responding to the demand for guidance by the research community and the lack of a comprehensive research and oversight policy, the National Academies (National Academy of Science, National Academy of Engineering and the Institute of Medicine) filled the vacuum and assumed a leadership role. In 2005, they released the report “Guidelines to Human Embryonic Stem Cell Research” to help steer universities and research institutes on how to provide research oversight on this ethically contentious issue.⁸
- The National Academy guidelines were voluntary, and some state and private funding agencies already had organizations in place with their own oversight procedures. Moreover, there was no mechanism with which to oversee the fulfillment of the guidelines.

The next administration should use the NIH and an ESCRO board within the agency to oversee stem cell research. The ESCRO board (similar to those recommended for universities by the National Academies) should contain representatives with expertise in developmental biology,

⁷ Research!America data is available online at www.researchamerica.org.

⁸ The National Academies report “Guidelines to Human Embryonic Stem Cell Research: is available online at www.nap.edu.

stem cell research, molecular biology, assisted reproduction, and ethical and legal issues in hESC research. The role of the board should be to review all grant applications involving the derivation of hESC lines and to develop policy options for all aspects of research involving human embryos. Moreover, NIH should work with states that have already implemented human stem cell programs to provide guidance on ethics and research, as well as to help with peer review.

In addition, all hESC lines used in NIH-funded project should be required to comply with informed consent procedures outlined by the National Academies. And any hESCs used in federally funded research should be available in a national or international cell banks so they can be characterized, tested, expanded and available for other researchers to utilize. This would require banks to have clear material transfer agreement procedures to allow for easy access to lines.

Recommendation 2.3: Continue the President's Council on Bioethics (PCB).

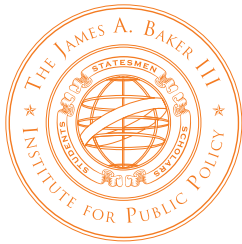
Findings:

- The PCB is a group of individuals (up to 18) appointed by the president to give advice on bioethical issues that may emerge as a consequence of advances in biomedical sciences and technology.
- The council and its members serve two-year terms, at which time both are reappointed by the president.
- The PCB was formed by the Bush administration in 2001, but the Clinton administration had a similar bioethics advisory group, the National Bioethics Advisory Commission, which dealt with some of the early issues related to human stem cell research.

President Obama should continue the PCB and select members early in the administration so they can continue the important work of investigating and discussing bioethical issues and providing policy recommendations to the President. In addition, the president should give the council a mandate, along with the necessary financial support, to carry out relevant policy research and formulate recommendations to guide the president and federal agencies on policy issues related to health and biomedical research.

Conclusion

As the United States undergoes a smooth transition from one administration to another, Americans and the global community have a unique opportunity to benefit from a change in the research policies of a traditional leader in biomedical research—especially in areas where current controversial policies have proved to be unpopular with the American public and allowed the United States to fall behind other nations in an important area of medical research. Human embryonic stem cell research was a new and virtually untested area of research in 2001. The George W. Bush administration created a compromise policy to help encourage limited hESC research. Unfortunately, over the past eight years, this compromise—and the complex system of policies and practices that resulted from it—has impeded research and negatively impacted the United States’ status as a leader in biomedical research. Many scientists around the country who are interested in human stem cell research have found other means to continue their research, if on a smaller scale, but polls have shown that most Americans understand the need for a uniform and comprehensive stem cell policy that includes research on all stem cell types as well as ethical oversight.



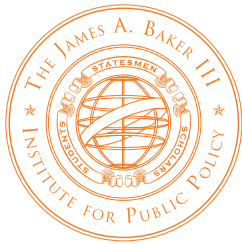
EDWARD P. DJEREJIAN

Founding Director and Janice and Robert McNair Chair in Public Policy

Ambassador Edward P. Djerejian, the founding director of the James A. Baker III Institute for Public Policy at Rice University, is one of the United States' most distinguished diplomats, whose career has spanned the administrations of eight U.S. presidents. Ambassador Djerejian is a leading expert on the complex political, security, economic, religious and ethnic issues of the Middle East. He has played key roles in the Arab-Israeli peace process, the U.S.-led coalition against Saddam Hussein's invasion of Kuwait, successful efforts to end the civil war in Lebanon, and the release of U.S. hostages in Lebanon. He is the author of "Danger and Opportunity: An American Ambassador's Journey Through the Middle East" (Simon & Schuster Threshold Editions, September 2008).

Prior to his nomination by President Bill Clinton as U.S. ambassador to Israel, he served both President George H.W. Bush and President Clinton as assistant secretary of state for Near Eastern affairs and President Ronald Reagan and President Bush as U.S. ambassador to the Syrian Arab Republic. Djerejian has also served as deputy assistant secretary of Near Eastern and South Asian affairs, as deputy chief of the U.S. mission to the Kingdom of Jordan, and as special assistant to President Reagan and deputy press secretary for foreign affairs in the White House.

Among other awards, Djerejian has been recognized with the Presidential Distinguished Service Award and the Department of State's Distinguished Honor Award. He holds a bachelor of science and an honorary doctorate in humanities from Georgetown University, and a doctor of laws, honoris causa, from Middlebury College.

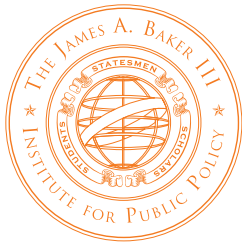


GEORGE W.S. ABBEY

Baker Botts Senior Fellow in Space Policy

George Abbey is the Baker Botts Senior Fellow in Space Policy at the Baker Institute. From 1996 to 2001, he served as the director of NASA Johnson Space Center (JSC). Abbey graduated from the U.S. Naval Academy in 1954 and received a master's degree in electrical engineering from the U.S. Air Force Institute of Technology in 1959. Prior to being assigned as an Air Force captain to NASA's Apollo Program at the Manned Spacecraft Center in 1964, he served in the Air Force Research and Development Command and was involved in the early Air Force manned space activities including the Dyna-Soar Program. In 1976, he was named director of flight operations, a position in which he was responsible for operational planning and management of flight crew and flight control activities for all manned space flight missions. In 1983, he became director of the Flight Crew Operations Directorate. In 1990, Abbey was selected as deputy for operations and senior NASA representative to the Synthesis Group and was charged with defining strategies for returning to the moon and landing on Mars. In 1991, Abbey was appointed senior director for civil space policy for the National Space Council in the Executive Office of the President.

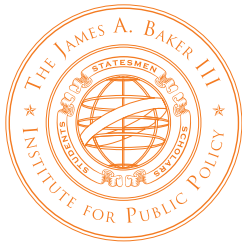
In a distinguished federal service career that spanned a half-century, Abbey received numerous three NASA Distinguished Service Medals. Abbey was a member of the operations team presented with the Medal of Freedom, the nation's highest civilian award, in 1970 by President Richard Nixon for its role in support of the Apollo 13 Mission.



JOE BARNES

Bonner Means Baker Fellow

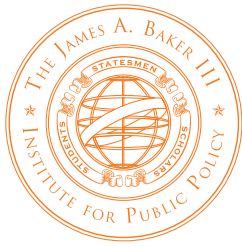
Joe Barnes has been a research fellow at the Baker Institute since 1995 and is currently the Bonner Means Baker Fellow at the institute. His chief area of interest is international economics, with a focus on the geopolitics of energy. In addition to numerous institute studies, Barnes' work has also appeared in The New York Times, The Houston Chronicle, Survival, Z Magazine, Oil and Gas Journal, Energy Markets, the Newsletter of the Royal United Services Institute, the SAIS Policy Forum Series, and the National Interest. He is a contributor to two volumes: "Energy in the Caspian Region" (Palgrave) and "United States Tax Reform in the 21st Century" (Cambridge University Press). His work was recently published in "Natural Gas and Geopolitics from 1970 to 2040" (Cambridge University Press, 2006). Barnes is also advisor to the Baker Institute Student Forum. From 1979 to 1993, he was a career diplomat with the United States State Department. Barnes is a graduate of Princeton University.



CHRISTOPHER BRONK, Ph.D.

Fellow in Technology, Society and Public Policy

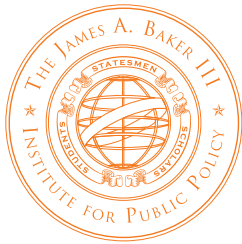
Christopher Bronk is the Baker Institute fellow in technology, society and public policy (TSPP). He previously served as a career diplomat with the United States Department of State on assignments both overseas and in Washington, D.C. His last assignment was in the Office of eDiplomacy, the department's internal think tank on information technology, knowledge management, computer security and interagency collaboration. He also has experience in political affairs, counternarcotics, immigration and U.S.–Mexico border issues. Since arriving at Rice, Bronk has divided his attentions among a number of areas including information security, technology for immigration management, broadband policy, Web 2.0 governance and the militarization of cyberspace. He teaches on the intersection of computing and politics in Rice's George R. Brown School of Engineering. Bronk has provided commentary for a variety of news outlets including ABC, NPR, the BBC and The Houston Chronicle. His latest research is in the political informatics of transnational terror. Holding a Ph.D. from The Maxwell School of Syracuse University, Bronk also studied international relations at Oxford University and received a bachelor's degree from the University of Wisconsin–Madison.



LESLIE COUNTRYMAN

Senior Staff Researcher, Tax Policy Program

Leslie Countryman recently joined the Tax and Expenditure Policy Program after spending four years at O'Connor & Associates as a senior real estate market analyst. While at O'Connor & Associates, Countryman consulted on residential and commercial real estate developments across the country. Her current research interests include housing tax policy and federal income tax and expenditure policy. Countryman completed her B.B.A. in economics at the University of Oklahoma and holds a master's in economics from Tulane University.

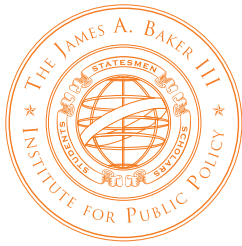


JOHN W. DIAMOND, Ph.D.

Edward A. and Hermena Hancock Kelly Fellow in Tax Policy

John W. Diamond is the Edward A. and Hermena Hancock Kelly Fellow in Tax Policy at the Baker Institute, an adjunct professor of economics at Rice University and CEO of Tax Policy Advisers, LLC. His research interests are federal tax and expenditure policy, state and local public finance, and the construction and simulation of computable general equilibrium models. His current research focuses on the effects of reducing corporate tax rates and the distributional effects of tax reform. Diamond's most recent publications examine (1) the effects of implementing a consumption tax on business equity values and housing prices, (2) the impact of enacting a National Retail Sales Tax on the homebuilding industry, and (3) the welfare and macroeconomic effects of deficit-financed tax cuts. He is co-editor of "Fundamental Tax Reform: Issues, Choices and Implications" (The MIT Press, 2008). He was the principal investigator on a sponsored research project with the U.S. Treasury Department's Office of Tax Analysis that examined the economic effects of the tax reform options

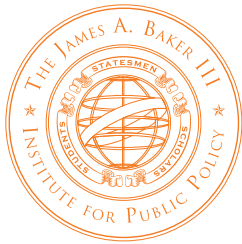
Committee on Taxation, United States Congress (2000–2004). He has also served as a consultant on the efficacy of structural adjustment programs to the World Bank. He received his Ph.D. in economics from Rice University in 2000.



VIVIAN HO, Ph.D.

James A. Baker III Institute Chair in Health Economics

Vivian Ho is the James A. Baker III Institute Chair in Health Economics, and she is an associate professor in the department of medicine at Baylor College of Medicine. She is also an associate professor in the department of economics at Rice University. Ho's research examines the effects of economic incentives and regulations on the quality and costs of healthcare. Her research is widely published in economics, medical and health services research journals. Ho's research has been funded by the National Institutes of Health (NIH), the Agency for Healthcare Research and Quality, and the American Cancer Society. Ho has served on the Board of Scientific Counselors for the National Center for Health Statistics, as well as on the NIH Health Services, Outcomes and Delivery study section. She is also a founding board member of the American Society for Health Economists. Ho received her A.B. in economics from Harvard University, a graduate diploma in economics from The Australian National University and a Ph.D. in economics from Stanford University.

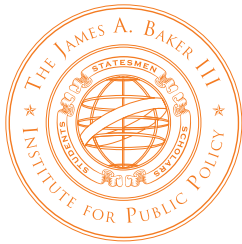


AMY MYERS JAFFE

Wallace S. Wilson Fellow in Energy Studies

Amy Myers Jaffe, a Princeton University graduate in Arabic studies, is the Wallace S. Wilson Fellow in Energy Studies at the Baker Institute. Jaffe's research focuses on oil geopolitics, strategic energy policy including energy science policy, and energy economics. Jaffe is widely published and served as co-editor of "Energy in the Caspian Region: Present and Future" (Palgrave, 2002) and "Natural Gas and Geopolitics: From 1970 to 2040" (Cambridge University Press, 2006). Jaffe served as a member of the reconstruction and economy working group of the Baker/Hamilton Iraq Study Group, as project director for the Baker Institute/Council on Foreign Relations Task Force on Strategic Energy Policy, and as a principal advisor to USAID's project on Options for Developing a Long Term Sustainable Iraqi Oil Industry. She is currently serving as a strategic advisor to the American Automobile Association (AAA) of the United States.

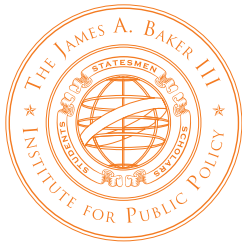
Jaffe was among the 2004 Key Women in Energy–Americas honorees in the Pathfinders/Trailblazers category. In 2005 she was an honoree for Esquire's annual 100 Best and Brightest in the contribution to society category, and Elle magazine's 2006 Women for the Environment. She has been named to Who's Who in America, 2008, and was a contributor to Foreign Policy's "21 Solutions to Save the World" (May/June 2007). She is currently a member of the Council on Foreign Relations. Prior to joining the Baker Institute, Jaffe was the senior editor and Middle East analyst for Petroleum Intelligence Weekly.



NEAL LANE, PH.D.

Senior Fellow in Science and Technology Policy

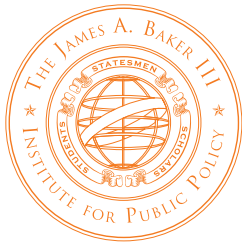
Neal F. Lane is the senior fellow in science and technology policy at the Baker Institute. He is also the Malcolm Gillis University Professor at Rice University and professor in the department of physics and astronomy. Previously, Lane served in the federal government as assistant to the president for science and technology and director of the White House Office of Science and Technology Policy (OSTP) from August 1998 to January 2001, and he served as director of the National Science Foundation (NSF) and member (ex officio) of the National Science Board from October 1993 to August 1998. Before his post with NSF, Lane was provost and professor of physics at Rice, a position he had held since 1986. He first came to the university in 1966, when he joined the department of physics as an assistant professor. In 1972, he became professor of physics and space physics and astronomy. He left Rice from mid-1984 to 1986 to serve as chancellor of the University of Colorado at Colorado Springs. Additionally, from 1979 to 1980, while on leave from Rice, he worked at the NSF as director of the Division of Physics. Lane received his Ph.D., M.S. and B.S. in physics from the University of Oklahoma.



WILLIAM MARTIN, PH.D.

Harry and Hazel Chavanne Senior Fellow in Religion and Public Policy

William Martin is the Harry and Hazel Chavanne Senior Fellow in Religion and Public Policy at the Baker Institute and the Chavanne Emeritus Professor of Sociology at Rice University. His areas of research and writing at the Baker Institute focus on two major sets of issues: 1) the political implications of religion, particularly fundamentalist religion, and 2) ways to reduce the harms associated with both drug abuse and drug policy. His articles, most of which deal with aspects of religion, have appeared in such publications as *The Atlantic Monthly*, *Harper's*, *Esquire* and *Texas Monthly* — for which he writes a monthly column, “Faith Bases,” about religion in Texas — as well as in professional journals. His book, “A Prophet with Honor: The Billy Graham Story,” is regarded as the authoritative biography of Billy Graham. An updated edition of his 1996 book, “With God on Our Side: The Rise of the Religious Right in America,” the companion volume to a six-hour documentary PBS miniseries of the same name, was reissued in June 2005 by Broadway Books. He is a frequent guest on national and local news and discussion programs. During his 37 years at Rice, Martin has received numerous teaching awards, including a Lifetime Award for Excellence in Teaching.



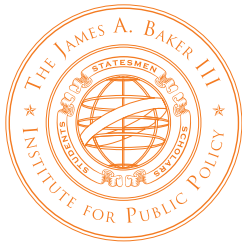
KIRSTIN R. W. MATTHEWS, PH.D.

Fellow in Science and Technology Policy

Kirstin R. W. Matthews is a fellow in science and technology policy at the Baker Institute. She is responsible for managing the activities of the Science and Technology Policy Program, which includes planning and organizing conferences, as well as researching and writing Baker Institute policy reports and research papers, among other science and technology policy briefs. Matthews' research focuses on the intersection between traditional biomedical research and public policy. Her current projects include the Baker Institute International Stem Cell Policy Program, the Civic Scientist Lecture Series and Outreach Program, and policy studies in research and development funding, global health and climate change.

Matthews came to Rice University as a postdoctoral research associate in the department of physics and astronomy and a research assistant at the Baker Institute in 2003. From 2004 to 2006, Matthews was also the project director for the task force, Access to Health Care in Texas: Challenges of the Uninsured and Underinsured. The task force released the report, "Code Red: The Health of Texas," in April 2006, followed by an update, "Code Red 2008," in March 2008.

Matthews' has a B.A. in biochemistry from The University of Texas at Austin and a Ph.D. in molecular biology from The University of Texas Health Science Center at Houston.



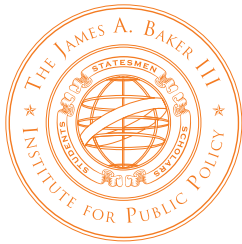
KENNETH B. MEDLOCK III, Ph.D.

Fellow in Energy Studies

Kenneth B. Medlock III is a fellow in energy studies at the Baker Institute and adjunct assistant professor in the Rice University Department of Economics. Medlock received a Ph.D. in economics from Rice in 2000 and was the Baker Institute's M. D. Anderson Fellow from 2000 to 2001. Afterward, he held the position of corporate consultant at El Paso Energy Corporation.

Medlock leads the Baker Institute Energy Forum's natural gas program. He is a principal in the development of the Rice World Natural Gas Trade Model, aimed at assessing the future of international natural gas trade. He also teaches introductory and advanced courses in energy economics. Medlock's research covers a wide range of topics in energy economics and has been published in numerous academic journals, book chapters and industry periodicals, as well as in various Energy Forum studies. He is a member of the International Association of Energy Economics (IAEE), and in 2001 he won (joint with Ron Soligo) the IAEE Award for Best Paper of the Year in the Energy Journal.

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