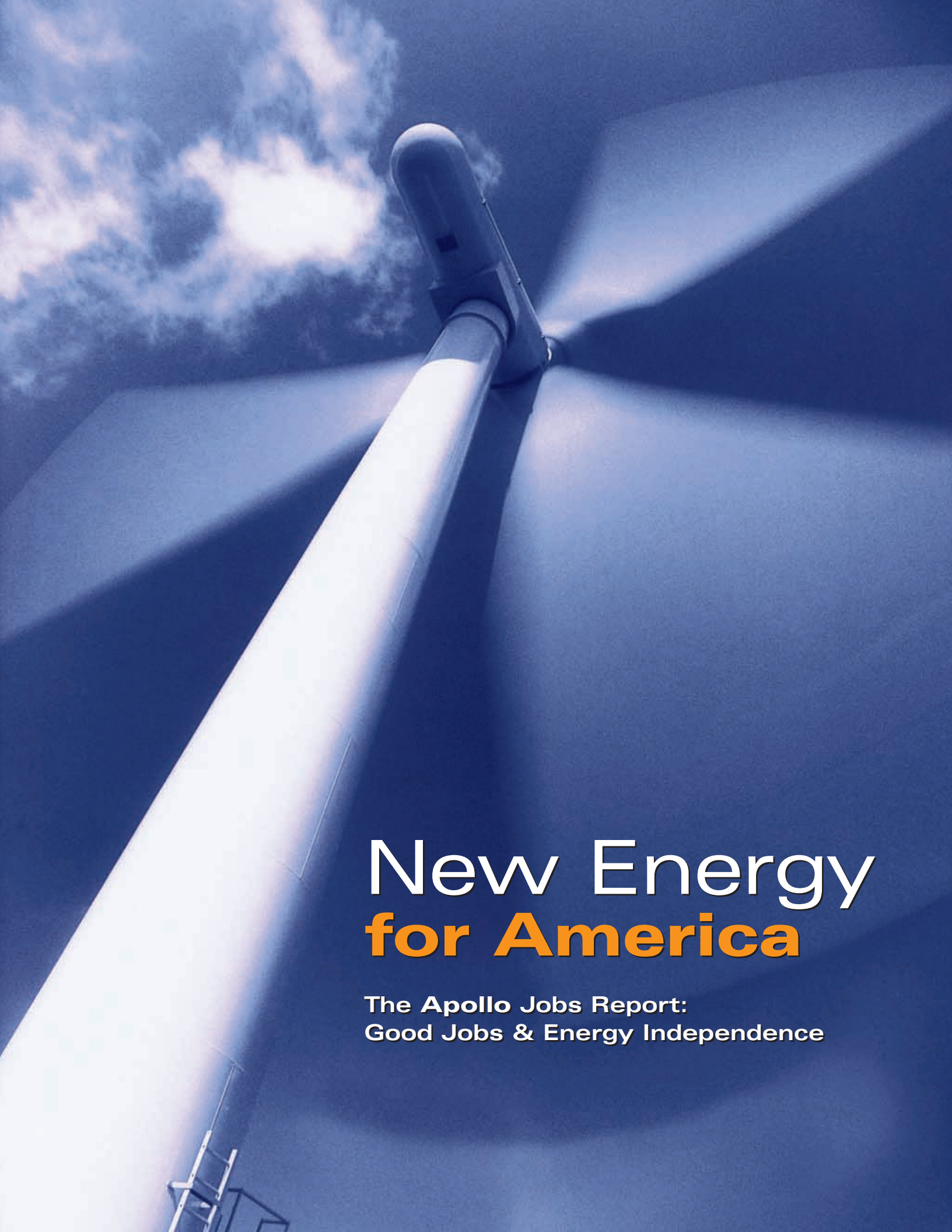

New Energy for America

The Apollo Jobs Report: Good Jobs & Energy Independence

www.apolloalliance.org

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New Energy for America

The Apollo Jobs Report: For Good Jobs & Energy Independence

A Report to the Apollo Alliance

Jointly Produced by:
The Institute for America's Future
& The Center On Wisconsin Strategy

With Economic Analysis Provided by:
The Perryman Group, Waco TX.

January, 2004

INTRODUCTION:
Apollo, a Bold Challenge for America's Future

Americans have always pulled together in tough times. Using ingenuity, hard work, and can-do spirit, we created the strongest industrial base the world had ever seen during and after World War II. In the sixties, we rose to President Kennedy's challenge and achieved a goal that seemed beyond our reach: We put a man on the moon in less than a decade. It's time to roll up our shirt sleeves again.

Energy is the lifeblood of a modern economy. And America's future prospects will depend upon the secure supply of affordable and sustainable energy that can fuel our continued growth and prosperity. But growing dependence on foreign oil, unprecedented energy failures, and mounting evidence of accelerating environmental problems are clear warning signs that America's current policies cannot be sustained. It is time for a bold initiative – with the vision and the scope of the original Apollo program – to end America's dependence on foreign oil and create millions of good jobs building the sustainable energy system of the next century.

A new Apollo initiative will address challenges that America can no longer afford to ignore: the economic imperative of staunching the hemorrhaging of manufacturing jobs and of modernizing our energy infrastructure; the national security imperative of limiting our dependence on foreign oil; the environmental imperative of moving to diverse, sustainable and renewable energy sources to protect our air, land, and water; and the social imperative of reconstructing our communities for the benefit of all.

It is time to marshal the same spirit of hope and urgency as the original Apollo Project. We need a new Apollo Project – a national commitment that mobilizes resources to achieve energy independence in one generation. It is time for a forward looking plan that attacks many problems together, that meets our energy needs today and tomorrow, that creates jobs and strengthens the economy, that cleans up the environment and preserves communities. The new Apollo Project calls for investing $300 billion in federal resources toward achieving a new energy infrastructure that is diversified, environmentally safe, and more efficient.

While the Apollo project is about changing our future, it is built on an honest assessment of our past and the recognition that public leadership and meaningful public investment have historically been essential for economic development and promoting new technology. In the past, government investment in the railroads, in the national highway system, in the space program, and in the research and development of the micro chip and other technologies elevated our economy and quality of life to new levels. We cannot sit on the sidelines now if America is to move forward. The American economy will not grow its way out of problems thirty years in the making without real political leadership.

The new Apollo Project is based on the recognition that clean energy can be the next great engine of jobs and growth – that mobilizing public and private investment in clean energy technologies such as solar and wind power, hydrogen fuel cells and highly efficient American made cars, will create a new generation of high wage manufacturing and construction jobs, capture growing markets of the future, reduce our dependence on foreign oil imports, create a resilient energy system, strengthen our cities and rural communities, bolster national security, and clean up our environment.

Unlike aimless corporate subsidies or tax cuts that create long term structural deficits, the new Apollo Project mobilizes public and private investment toward a vital goal. This is a smart investment that can pay for itself, returning its initial cost and then some to the treasury, through increased economic activity and related tax revenues, as well as energy cost savings — to say nothing of improved public health, envi-

ronmental stewardship, and the many spill over benefits from new economic development. This is an investment in the future that will generate substantial dividends, both economic and social.

This report lays out a vision for a new Apollo Project, suggesting various public investment measures that can contribute to bringing about a bold and positive energy future. This study also provides a detailed analysis of the likely benefits brought about by such a forward looking effort, in economic, environmental, security, and social terms.

America Must Change Direction

American prosperity has been built on our nations leadership in invention and technology. Now, as the world must move to develop the technologies that allow for sustainable growth in a global economy, the US is lagging behind its competitors in the critical green markets of the future. At the same time that the United States is watching literally millions of jobs go abroad, we are losing our technological and competitive edge and our market share to foreign companies. Japan alone now controls 43% of the solar power market, an industry invented in America.[i] European countries control 90% of wind turbine production[ii], and the United States is importing fuel cells from Canada. These are markets that could be filled by US companies and jobs that could be filled by US workers. Investments like high speed rail and mass transit have also been delayed too long. Modernizing infrastructure, creates good jobs in American communities, new export products, stronger local economies, and improved consumer choice. If America does not invest in this new generation of technology- in this new generation of jobs- we risk losing the technological leadership that has been the foundation of our prosperity.

The United States economy pays a real price, for inefficient energy use. It is a price born by working families and their household budgets. Our aging, inadequate electrical grid is held together with baling wire and string, and deferred infrastructure investments in energy, water, roads, and transit, hurt the development of our cities and increase our energy inefficiency. Ever escalating dependence on foreign oil has left our nation and our economy vulnerable; while the failure to control pollution also imposes cost through lost resources and threats to public health.

We cannot continue down this path. We can do better. We can do what we have historically done best: invent and invest in new technologies and new industries.

Stripped to its essentials, the future prosperity of the US is critically dependent upon the capacity to be the leader in the next generation of products and services. . In an increasingly global and competitive environment, such innovation represents the vital advantage America requires to remain a high wage produc-

er in the international marketplace. It is vital that pubic and private investment be mobilized to insure that the US retains its technological leadership. The new Apollo Project is such a program of action-one that can substantially contribute to our energy independence and help restore our prosperity even as it positions our economy to succeed in the face of coming challenges.

America Can Change the Energy Future

Meeting the challenge of the new Apollo Project requires rethinking present policies, redirecting resources, breaking old boundaries, and forging new alliances. It means abandoning the trade off between the health of the environment and the health of the economy, and refusing to sacrifice good jobs, stewardship, or technological innovation. It demands we direct our resources toward solving more than one problem at a time. It will require leadership and a shared national commitment, just like John Kennedy's Apollo Project, and we must do it, not because it is easy, but because it is hard ... and necessary.

The new Apollo Project will create jobs and new technologies, a bolder national security strategy, a stronger, safer economy and a healthier environment by pursuing four broad strategies:

- Diversify our energy sources: making America less dependent on foreign oil, while making energy more secure, more affordable and reliable, and less polluting
- Invest in the industries of the future: promoting new technology, improving manufacturing processes, and expanding markets for American durable goods.
- Promote construction of high performance, energy efficient buildings: saving money and rebuilding more livable, more equitable, and healthier environments, and
- Drive investment in cities and communities: renewing our commitment to building smart public infrastructure for transportation, energy, and other vital public services.

Taken together, these strategies combined with national commitment, public investment, meaningful standards, and political will, can bring about enormous benefits for both America and the world.

This analysis lays out the vision for a new Apollo Project as expressed in the Apollo 10 point plan for energy independence, and suggests various policy measures that could contribute to achieving energy independence within a generation. This report also outlines many of the significant economic, environmental and social benefits that could result from adopting and investing in a forward looking energy policy that pays for itself, through increased economic activity, related tax revenues, and greater energy cost savings.

SECTION 1:
The Benefits of the Apollo Project

The Apollo Project calls for an investment of $300 billion in federal money over 10 years, to revitalize our manufacturing capacity, rebuild neglected public infrastructure, close the growing technology gap with our foreign competitors, preserve the environment, and generate good jobs for America's working families.

Economic Benefits:

The economic benefits included in this report are the results of a classic input/output modeling exercise and analysis conducted by the non-partisan Perryman Group in Waco, Texas. The findings from this study suggest that Apollo's $300 billion investment in America's economic and energy future will:

- Add more than 3.3 million jobs to the economy
- Stimulate $1.4 trillion in new Gross Domestic Product
- Repay the $300 billion Federal cost of the project, through $306.8 billion in increased Federal tax revenue from increased earnings, during the 10 year period of its implementation with additional, sizable ongoing fiscal benefits thereafter.
- Stimulate the economy through adding $953 billion in Personal Income and $323.9 billion in Retail Sales
- Offer a 22.3% annual rate of return when the effects of the project development and the ongoing stimulus of the project are calculated.
- Produce $284 billion in net energy cost savings[iii]

Implementing the Apollo investments outlined here will add 19,463,949 Person-Years of Employment over 10 years, or an average of nearly 2 million jobs each year sustained throughout the duration of the project. In addition, an ongoing stream of stimulus will result from this significant investment program creating $79.7 billion in annual Gross Domestic Product and 1,392,415 Permanent Jobs. When combined, the sustained project-related employment mentioned above and the ongoing stimulus, represent more than 1.4 trillion dollars in GDP gains and over 3.3 million jobs.

Good Job Benefits

Like the telecommunications revolution before it, the industries necessary to meet the goals of Apollo on average pay higher wages and provide better benefits such as health care and retirement, crossing a wide spectrum of industry sectors, from skilled craftsmen, to designers and engineers, from public employees to laborers. Increased investment and access to capital can be used as tools for economic development, increasing local investment within communities, stabilizing basic industries to retain jobs, and creating new markets that build entirely new industries. By reinvesting in our industrial jobs base and focusing on new construction and new infrastructure and public investment, these jobs can also help create and retain good union jobs that ensure family supporting wages.

- Investments in improving the performance of our existing energy system – improved electricity transmission to support distributed generation, and implementing the best available technology at existing utilities – can create very substantial numbers of good jobs in new construction, and improved maintenance and operations.

- Increasing incentives for energy efficiency also creates substantial new construction investment and good jobs retro-fitting buildings. Energy efficiency is far more labor intensive than generation, creating 21.5 jobs for every $1 million invested, compared to 11.5 jobs for new natural gas generation.[iv] These jobs include installation, ongoing operations and maintenance of building systems, and new manufacturing to meet the increased demand for energy efficient appliances and building systems. Shifting spending from wasted energy costs to investments in skilled labor new technology.

- Renewable energy also compares favorably on job creation, with studies showing four times as many jobs per megawatt of installed capacity as natural gas[v] and 40% more jobs per dollar invested than coal, renewables especially support substantial numbers of new jobs in manufacturing and the construction trades.[vi] The addition of over 70,000 megawatts of wind power that is expected to come online over the next decade, alone, would generate $75 billion in new investment.[vii]

- Transportation infrastructure improvements will also create substantial employment in sectors with good pay and benefits. New transit system starts, maintenance of the nation's passenger train system, development of regional high speed rail networks, and improvements in the nation's roads and highways will all generate significant numbers of jobs in basic industries. Infrastructure investments also guarantee that spending is made locally, directly stimulating the domestic economy, supporting small business and regional labor markets.

- In all of these policies there are also opportunities to link implementation to policy tools that create good jobs, including training and apprenticeship programs, project labor agreements, job quality standards, enforcement of fair labor practices, and other tools for ensuring high quality, high skill and high wage employment.

The policies we put in place in coming years will determine whether these benefits are fully realized, and whether the jobs created are good jobs.

Environmental Benefits

By promoting a less polluting and more efficient energy system, the new Apollo Project will contribute to a host of environmental benefits. Specifically, the Apollo Project could:

- Reduce national energy consumption by 16%[viii]
- Reduce transportation related petroleum consumption between 1.25 million barrels[ix] per day and 2.55 million barrels per day[x] or the equivalent of cutting Persian Gulf imports between 54%[xi] to 110%[xii]
- Place 91 million advanced performance vehicles (38% of fleet) on the road by 2015[xiii]
- Meet 15% of electricity demand through renewable resources by 2015, placing the nation on track to achieve 20% of electricity from renewables by 2020
- Reduce SO2 emissions by 28%;[xiv] reduce NOx emissions by 13%;[xv] reduce carbon emissions by 23%[xvi]
- Produce cleaner air and reduced human health impacts like asthma

Other National Security and Social Justice Benefits from an Apollo Approach

A National commitment to invest in state of the art, forward looking energy systems will:

- Reduce dependence on foreign oil by eliminating demand nearly equivalent to current Persian Gulf imports, improving national security and saving consumers money
- Reduce demand for natural gas bringing price stability to that volatile market, and increased consumer energy supply choices
- Restore America's leadership in technology innovation, helping global economic competitiveness and reducing our trade deficit
- Rebuild aging public infrastructure preserving the quality of public services, and protecting the fiscal health of local governments and the vitality of communities.
- Improve social equity for low income urban workers by increasing job access and mobility, career ladders and training opportunities, and moderating household energy costs

Clearly, the new Apollo Project provides innovative and hopeful solutions to some of America's most pressing problems. It is a smart investment that produces many more benefits than it costs and more than pays for itself over time. A more detailed examination of the major benefits of pursuing a new Apollo project follows in the next chapter which spells out specific policy measures that could bring about new energy independence while creating good jobs, sound foreign policy, a healthier environment and stronger communities.

SECTION 2: Launching Apollo
The 10 Point Plan

The Apollo Alliance has built a broad coalition around a 10 point plan for energy independence, uniting labor and environmental advocates with supporters of sound urban, agricultural, and foreign policy, and proponents of civil rights and economic justice. The following 10 point plan is the basis for this growing national consensus on the need for renewed investment in a modern energy infrastructure, good jobs, and energy freedom.

The Ten-Point Plan for Good Jobs and Energy Independence

1 **Promote Advanced Technology & Hybrid Cars:** Begin today to provide incentives for converting domestic assembly lines to manufacture highly efficient cars, transitioning the fleet to American made advanced technology vehicles, increasing consumer choice and strengthening the US auto industry.

2 **Invest In More Efficient Factories:** Make innovative use of the tax code and economic development systems to promote more efficient and profitable manufacturing while saving energy through environmental retrofits, improved boiler operations, and industrial cogeneration of electricity, retaining jobs by investing in plants and workers.

3 **Encourage High Performance Building:** Increase investment in construction of "green buildings" and energy efficient homes and offices through innovative financing and incentives, improved building operations, and updated codes and standards, helping working families, businesses, and government realize substantial cost savings.

4 **Increase Use of Energy Efficient Appliances:** Drive a new generation of highly efficient manufactured goods into widespread use, without driving jobs overseas, by linking higher energy standards to consumer and manufacturing incentives that increase demand for new durable goods and increase investment in US factories.

5 **Modernize Electrical Infrastructure:** Deploy the best available technology like scrubbers to existing plants, protecting jobs and the environment; research new technology to capture and sequester carbon and improve transmission for distributed renewable generation.

6 **Expand Renewable Energy Development:** Diversify energy sources by promoting existing technologies in solar, biomass and wind while setting ambitious but achievable goals for increasing renewable generation, and promoting state and local policy innovations that link clean energy and jobs.

7 **Improve Transportation Options:** Increase mobility, job access, and transportation choice by investing in effective multimodal networks including bicycle, local bus and rail transit, regional high-speed rail and magnetic levitation rail projects.

8 **Reinvest In Smart Urban Growth:** Revitalize urban centers to promote strong cities and good jobs, by rebuilding and upgrading local infrastructure including road maintenance, bridge repair, and water and waste water systems, and by expanding redevelopment of idled urban "brownfield" lands, and by improving metropolitan planning and governance.

9 **Plan For A Hydrogen Future:** Invest in long term research & development of hydrogen fuel cell technology, and deploy the infrastructure to support hydrogen powered cars and distributed electricity generation using stationary fuel cells, to create jobs in the industries of the future.

10 **Strengthen Regulatory Protections:** Encourage balanced growth and investment through regulation that ensures energy diversity and system reliability, that protects workers and the environment, that rewards consumers, and that establishes a fair framework for emerging technologies.


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SECTION 3:
Toward a Model Investment Agenda:

To give form to the high level goals of the 10 point plan, and to provide a scenario for modeling the potential benefits of implementing such a Federally led investment plan for a national transition to a clean energy economy, a Model Investment Agenda has been developed. There are many ways that such a program could be implemented, and coalition members may differ on particulars of any given proposal, but the following model agenda reflects a concrete potential set of actions, each of which could contribute to reducing the energy intensity of the overall economy, and the environmental impact of energy production and use. This Agenda is not intended as a framework for legislation, but is used to illustrate the potential economic and environmental benefits that can come from meaningful and sustained Federal leadership in advancing a comprehensive suite of clean energy investments.

Benefits from The New Apollo Project			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$313.72 Billion*	$1.43 Trillion	$953.87 Billion	3,338,810

This investment agenda focuses on federal leadership in four areas of activity: 1) Increasing Energy Diversity, 2) Investing in the Industries of the Future, 3) Promoting High Performance Building, and 4) Rebuilding Public Infrastructure. Each of these activity areas represent a body of policy that has been proposed in other contexts, often representing policy innovations that have been tested by state and local leaders and shown to deliver substantial results. Framing the project in this way ensures that such an investment agenda can move quickly into real world projects that create good jobs, improve our environment, reinvigorate our downtowns and urban areas, and decrease our dependence on foreign oil.

The Apollo Project anticipates the need for investment led strategies, that include tax incentives to encourage new private sector activity, policies that expand access to financing and increase capital investment, direct public spending on infrastructure and other needs, and federal support for State and local actions through block grants and other tools that bring new resources directly to the point of community development. Implementing Apollo will require a mix of these investment strategies, as well as development of regulatory measures that ensrure a level playing field, internalize costs, and correct market distortions.

Implementing Apollo will not only require national actions, regional solutions involving state and local leaders are also a central part of improving our national approach to economic development. Regional strategies acknowledge the diversity of our energy supplies, costs, and needs, and ensure that we do not take a one size fits all approach. Further, State and local governments profoundly shape the sustainability of our growth, from economic development subsidies, to land use management, to investments in education and worker training, policies undertaken at the regional level are a critical building block for ensuring real energy independence in a way that both protects our environment, and revitalizes our economy.

** For a detailed explanation of total federal investments please see endnote lxviii*

A) Increasing Energy Diversity

Benefits from Energy Diversity			
Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$49.17 Billion	$414.956 Billion	$ 278.70 Billion	932,095

Producing clean and renewable energy from diverse sources, and reinvesting in smart energy infrastructure will create large numbers of skilled jobs and offer improved security, price stability, reduced pollution, and new economic development. In many US states, energy policies based on the use of renewables have been linked to fair labor standards and job quality provisions, and have been used as a tool for economic development that increases construction jobs and local manufacturing content. Renewable energy investments have at times been viewed as a threat to utilities, but this is changing, increasingly renewables are being used to target the growth in energy demand and peak load, protecting existing workers and consumers, and replacing expensive energy imports with locally produced energy.

B) Investing in the Industries of the Future

Benefits from Industries of the Future			
Federal Investment	**GDP**	**Personal Income**	**Total Jobs**
$75.5 Billion	$392.56 Billion	$255.06 Billion	900,673

An aggressive and immediate effort to expand domestic production of highly efficient manufactured goods like hybrid cars, and energy efficient appliances, will drive new investment toward existing plants and workers today, rather than allowing the market to become dominated by imports and foreign transplants. In addition to the creation of new manufactured products, a number of policies can increase domestic investment in more efficient manufacturing processes, driving new capital investments and improved use of skilled labor in the operation and maintenance of production facilities, technologies like industrial cogeneration, combined heat and power, and improved the operation of industrial boilers can offer improved energy savings, reduced pollution, and long term benefits to Americas productive industrial base. Significant investment in domestic manufacturing capacity should be coupled with a predictable and equitable increase in standards. Subsidies should be closely tied to appropriate standards to ensure that environmental, efficiency, and employment gains are actually realized.

C) Promoting High Performance Building

Benefits from High Performance Buildings			
Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$89.9 Billion	$373.03 Billion	$250.17 Billion	827,260

Representing nearly 235 billion square feet,[xvii] buildings account for 70% of total U.S. electricity consumption and 39%[xviii] of primary energy consumption, end use of energy in buildings is one of the largest areas of energy demand in the economy. In 2001, buildings consumed roughly 37.6 quadrillion BTUs at a cost of $293.6 billion[xix]. Energy efficiency is an important means of meeting demand for the services of comfort, warmth and light that we require in our homes and workplaces. Yet, our built environment remains highly inefficient. Improving financing and providing incentives for the construction and retrofit of high performance buildings can drive an explosion of new investment in high skill construction jobs and ongoing building operations. Improving efficiency is a clear win for workers, consumers, and the environment – using more skilled labor while improving performance and saving money.

D) Rebuilding Public Infrastructure

Benefits from Infrastructure			
Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$99.15 Billion	$252.46 Billion	$169.93 Billion	678,781

State budget shortfalls total over $97.6 billion nationwide for FY 2003- 2004.[xx] Metropolitan regions lost 640,000 jobs last year[xxi]. At the same time, urban disinvestment and sprawl have increased energy consumption, as average commutes grow in time and distance, raising pollution levels. Developing a strong policy of urban reinvestment driven by smart infrastructure construction will create good jobs as cities focus on increasing density and new intermodal development. Increased construction and infrastructure investment will create demand for steel and cement, and new opportunities for transit workers, even as it reduces demand for imported oil. Sprawl and urban disinvestment have separated low income and minority residents from areas of job growth, and drained resources for education, government services, and maintenance of existing neighborhoods. Rebuilding our cities will increase the levels of municipal services, and improve job access and mobility for urban workers. Regional transportation planning and infrastructure investment is good energy policy, good environmental policy, and good for America's working families.

Increasing Energy Diversity

Worldwide, 70,000 megawatts of wind power will be put online over the next decade, representing $75 billion worth of investment.[xxii] But experts predict that much more is possible with proper incentives and regulation. Renewable energy creates skilled jobs and offers improved security, price stability, reduced pollution, and new economic development. An Apollo project will invest aggressively in deploying a broad range of new energy technology, and reducing the environmental impact of existing energy sources in a way that creates and retains jobs within the utility sector.

US manufacturers are losing the growing global market for renewable energy technology. Non-U.S. markets now account for over 90% of solar photovoltaic installations annually, a technology invented in this country. The Japanese government outspends the US by more than six times on promoting the development and deployment of solar technology,[xxiii] and wind turbine manufacture is dominated by European firms. State policies to increase the percentage of renewable energy, however, can help to reverse this trend by awarding additional credits for locally manufactured content. Establishing a clear national policy framework for promoting renewable energy will also improve long term financing, and encourage manufacturers to cite facilities domestically. Modern wind towers for example are very large, and require substantial amounts of steel and on site assembly. Wind manufacturers receive substantial benefits from locating manufacturing facilities near the point of installation.

At the state level, policies that increase the use of renewable energy have been used as a tool for economic development that increases construction jobs and local manufacturing content, and have been linked to job quality provisions, training and apprenticeship opportunities, fair labor standards and other important labor law advances. Renewable energy investments have at times been viewed as a threat to utilities, but can be designed to target the growth in energy demand and peak load, in order to protect existing workers, and offset expensive energy imports of liquefied natural gas (LNG) with locally produced energy.

In order to unleash the potential of renewable energy as both an economic development engine that creates good jobs and a viable alternative to traditional energy sources, we must adopt a policy agenda that, on the one hand, drives investment into the industries that support its development, and on the other, uses mechanisms that build and protect markets for its output. The following section outlines a menu of investment proposals that increase the diversity of our energy system, improve environmental performance in traditional generation, and encourage renewable energy's viability in the marketplace.

(A.1) Strengthening Renewable Energy Markets

Benefits from Renewable Energy Markets			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$30.00 Billion	$156.99 Billion	$103.59 Billion	365,555

A package of regulation and incentives can ensure that US producers will capture these emerging markets. The Production Tax Credit (PTC) is the most important incentive for developing the renewable energy industry. Guaranteeing a credit of 1.7 cents per kWh for a 10 year period is critical for ensuring long term financing of new wind production, and allowing economies of scale to develop. A PTC for wind would cost $15 billion over ten years. In addition, credits should be extended to a broader range of renewable technologies such as solar and geothermal energy, to further increase capacity and energy diversity. The Federal government can match state renewable benefits funds to ensure that capital investment is not constrained, provide investment tax credits on renewable technology, develop demonstration programs, invest in basic scientific research and workforce development programs, and the use its purchasing power to create new markets for renewable energy and for installations on public buildings.

A national goal for an aggressive but achievable percentage of renewable content could also be considered. For the purposes of this analysis we examined the impact of achieving a goal of 15% renewables by 2015 on a path toward 20% renewable energy by 2020. A number of states have used renewable energy standards effectively as economic development tools, to create new markets for renewables. These policies provide certainty in the emergence of this market, and can link clean energy investments

to local economic and workforce development. Moreover, renewable energy must be uniformly developed throughout the nation. The ideal renewable resource is determined by location. Some regions will benefit less from market ready technologies currently available. These lagging communities should be seeded to develop renewable options suited to their geographic circumstances. We therefore suggest that $6 billion of the above renewables commitment be spent on regional research and development projects. This will ensure that renewable energy's benefits are evenly distributed throughout the country.

Building a robust renewable energy market will also require additional federal and state policy supports including addressing existing net metering laws, which allow small producers to sell their electricity back to the grid. This will involve establishing fair and uniform interconnection rules to allow generators to supply surplus energy back to the grid at competitive rates; these issues can and should be resolved in a way that protects workers, consumers, and workplace safety, while supporting new technologies.

(A.2) Support Development of Bio-Energy Resources

Benefits from Biofuels Development			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$6.00 Billion	$23.41 Billion	$15.94 Billion	53,487

Biomass, or solar energy stored in organic matter, currently provides 2% of electricity demand. It is estimated however that biomass could provide up to 14% of our electricity demand, and 13% of our fuel. Tripling US biomass consumption would create $20 billion dollars in new farm income, eliminate the equivalent pollution of 70 million automobiles, and create demand for 42 million of acres of new energy crops like switch grass, and 159 million tons of corn stover. [xxiv] Methane gas can be extracted from landfills turning a pollutant into a productive new energy resource. New agricultural products like switch grass and hybrid willow trees are already creating new revenue for American farmers, while commercial byproducts like corn stover are creating valuable new cash crops. The Energy Future Coalition's Bioenergy and Agriculture Working Group has produced detailed findings on biomass potential. The following discussion reflects and incorporates their recommendations.

Maturing biomass markets create a host of political, economic, and environmental benefits. Since feedstock is abundant, wider adoption and deployment can produce large reductions in petroleum imports. This would promote independence and security while generating a new family of cash crops. Moreover, biomass is clean burning. In essence, the carbon used to grow the crop displaces the carbon released in burning. So long as the fuel is developed through a low fossil fuel process, biomass contributes little to carbon emissions. A federal bio-fuels program should incorporate bio-refineries with this essential trait.

Bio-fuels will eventually enjoy wide market adoption. In the interim, our fossil fuel infrastructure creates high risk for early market entrants. These perceptions should be eased through federally-sponsored demonstration programs that illustrate commercial viability while building real infrastructure. First the government should create a one-time competition that produces five to ten commercial scale demonstration plants within a five year period. One billion dollars can accomplish this. Additionally, bio-fuels research should be increased to $500 million per year to allow adequate pursuit of concurrent, commercially driven technology paths. These R&D efforts should be oriented towards making biomass cost competitive with fossil fuels. Last, new market building incentives should be made available to the agriculture industry. Agricultural cost incentives were not included, however, and no attempt has been made here to calculate them. Using EFC's framing as a guideline, Apollo recommends a federal allocation of $6 billion over ten years. We assume the federal allocation to produce a 50/50 match yielding a $12 billion total investment.

(A.3) Support Hydrogen Fuel Cell Research, Development and Deployment

Benefits from Fuel Cells			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$6.50 Billion	$17.34 Billion	$11.82 Billion	40,147

Presently, foreign manufacturers dominate the fuel cell market. US workers in chemical, electrical, and manufacturing sectors could easily do the work in a domestic fuel cell industry while renewables and agricultural producers could also contribute to hydrogen production. Investment tax credits coupled with direct research and development spending should be undertaken to promote a strong domestic industry. Senator Byron Dorgan (ND) has proposed a plan for the federal government to invest $6.5 billion into fuel cell deployment over ten years. A substantial federal investment will cover tax incentives to commercialize new technology, research and development to resolve remaining scientific and technical questions, educational programs, federal fleet purchase programs to build new demand through procurement policy, market entry assistance for companies navigating the difficult transition of bringing unfamiliar products to scale, and deployment programs for both stationary fuel cells used in electrical generation, and automotive fuel cells to help drive down production costs and accelerate economies of scale. This schedule could ultimately place 100,000 fuel cell vehicles on the road by 2010. It could annually place 2,500,000 vehicles on the road by 2020, supported by a hydrogen production and distribution infrastructure.[xxv] In addition, the federal government should place a premium on developing the intellectual capital to build a hydrogen economy. New emphasis must be placed on education and skills training-especially in engineering. This should be done through well-crafted school programs, workforce development, and union lead training programs.

(A.4) Develop Pilot Projects to Deploy a "Smart" Electrical Transmission Grid

Benefits from Smart Grid Investments			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$2.00 Billion	$202.97 Billion	$137.68 Billion	441,473

Recent black outs have demonstrated the substantial problems that exist in the electrical transmission network. The increasing pressures of deregulation and underinvestment have led to an outdated and increasingly fragile electrical grid with weak regulatory oversight to ensure reliability. Supporting new distributed renewable energy systems will require increased investments in research and development and new pilot implementation projects to produce a "smart grid." The self healing grid should be better suited to meet America's growing energy demands through advanced load management, and real time information gathering. Further, its decentralized structure would increase reliability, and improve national security. Moreover, it would promote increased use of distributed renewable sources such as stationary fuel cells, wind turbines, and other small scale generation, and improve demand management and address safety concerns through better real time information. In Congressional testimony, the CEO of the Electricity Innovation Institute, TJ Glauthier, states that $1 billion spent over 5 years on research and demonstration programs would be sufficient to successfully prototype a smart grid, and lay the regulatory groundwork to ensure it's implementation. A smart grid would then eventually stimulate $100 billion in deployment expenditures from its owners and operators. These assumptions for federal expenditures and broader leveraged investments have been adopted for this analysis, federal investments were extrapolated over 10 years to ensure thorough pursuit of a next generation transmission system. The significant private sector investment in implementing a smart grid accounts for the large GDP impact registered above.

(A.5) Improving Performance at Existing Utilities & IGCC Research and Development

Benefits from IGCC R&D			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$4.67 Billion	$14.25 Billion	$9.66 Billion	31,431

Regulation and incentives that improve environmental performance in existing coal fired power plants by deploying the best available technology like scrubbers to reduce pollution, can create good jobs and protect community health, and should be supported. Incentives for improved operation and maintenance of industrial boilers and the implementation of co-generation and combined heat and power systems can also serve to create good utility sector jobs, improve environmental performance, and provide efficient, affordable, and reliable energy to the electrical grid. Although in the United States, coal plant construction is in decline, globally development is expected to triple in coming years. In the face of this trend, it is essential that innovative technology for managing carbon emissions be researched so that the science and engineering will be ready should this technology need to be deployed. Industry representatives estimate that over ten years, the Federal cost of researching and developing Integrated Gasification and Carbon Capture (IGCC) coal technology would be $3.07 billion and $1.6 billion to research carbon sequestration[xxvi]. Coal gasification should be thoroughly understood in an environment of increasing environmental constraints where over half of all electrical generating capacity is currently supplied by coal. IGCC technology is important to workers in the utility industry, construction trades and mining and refining industries.

(A.6) Ensuring Reliable and Affordable Energy through Appropriate Regulation

Consumers, workers, and the environment should be protected by strong and appropriate regulation of energy markets. Deregulation has resulted in increased price volatility, reduced electric system reliability, reduced maintenance budgets, and lost jobs. As consumer protections have eroded, abusive market manipulations have resulted in scandals like the California energy crisis and the collapse of Enron. Deregulation has also set back efforts to improve "demand side management" and conservation. Preserving state regulatory authority over electricity markets will support the utility industry's legal "obligation to serve" electrical consumers; the Federal Energy Regulatory Commission's authority should not be expanded through imposition of its "Standard Market Design" plan, and the consumer protections within the Public Utility Holding Company Act (PUHCA) should not be abandoned or repealed, but rather strengthened. Further deregulation should be opposed, and regulatory safeguards that protect workers and consumers should be supported.

Basic protections for worker safety under OSHA and in the regulation of the energy sector, as well as landmark environmental legislation like the Toxic Release Inventory, the National Environmental Policy Act, and the Clean Air Act and Clean Water Act, are also fundamental to protecting the rights of communities and working families and must be maintained as robust tools for corporate accountability. These regulations have led to dramatic improvements in community health and environmental protection, they have also created good jobs for utility workers operating pollution control equipment. The United Association of Plumbers and Pipe Fitters (UA) and other members of the Building and Construction Trades have used these laws to ensure that new power plants are built using the best available technology, and to ensure that construction and operation of plants uses well paid labor union labor.

Standards are also an effective tool outside of the arena of Federal regulation. Pension funds and public investments allow workers and citizens to engage corporate behavior as owners, and to establish governance rules that take into account the needs of workers, communities, consumers, and the environment. Labor capital, and public pension funds offer a powerful lever for creating new markets for energy efficiency and the development of viable new industries in alternative energy, and to ensure that these new industries are responsive to the needs of workers and communities. At the local level, Living Wage Standards and Community Benefits Agreements have also been effectively employed by local community and labor alliances to ensure that economic development is accountable to public purposes like fair wages and environmental justice. Although the Apollo Project leads with a call for meaningful public investment, clearly establishing a strong regulatory framework to ensure appropriate corporate behavior, and markets that operate on fair rules, is a high priority for ensuring that these pressing public goals are realized.

Investing in the Industries of the Future

(B.1) Building the market for American made highly efficient cars

Benefits from Promote US Made Efficient Automobiles			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$30.00 Billion	$42.01 Billion	$26.27 Billion	128,885

The Energy Information Administration (EIA) of the U.S. Department of Energy (DOE) predicts that 3 million highly efficient cars will be added to the fleet each year by 2020.[xxvii] Under a continuation of current market conditions, the DOE estimates that with an aggressive policy program, over 11 million advanced-technology cars could be sold each year by 2015.[xxviii] If that market is to be met by US workers, new investments must be made immediately to build domestic capacity and expertise, increasing production as well as creating demand. In the face of industry trends toward increasing technological change and highly-efficient vehicles, US workers cannot afford to be left behind.

Research indicates that the marginal cost for building a highly efficient auto fleet is $102 billion over 20 years.[xxix] A ten year package of aggressive investment tax incentives linked to efficiency performance gains would help manufacturers to retool assembly lines for the production of hybrids and other highly efficient vehicles, locking new investment into existing plants and helping current workers to manage technological transition. These incentives should be front loaded to provide greater benefit for actions taken in early years, when the costs of transition for business are highest, and demand is not yet mature, and subsequently phasing out over 10 years. Beyond that time, the need for additional incentives could be reconsidered. The modeling exercise undertaken here assumes a highly conservative level of private sector investment resulting from federal incentives, and therefore significantly understates potential GDP gains.

Manufacturing investment incentives have the benefit of ensuring domestic production. Other policy tools that could supplement a manufacturing focused strategy include consumer tax credits, accelerated depreciation of assets for small businesses, and fleet purchasing incentives. If linked to standards for energy efficiency, these policies could all substantially increase demand for advanced technology cars, while guaranteeing environmental benefits. New procurement policies to leverage the purchasing power of government also can help to pull the market toward more efficient technology. Together, these policies would create a domestic market for American made highly efficient vehicles. A well-structured plan would be performance-based, revenue- technology- and personal choice- neutral.

These public subsidies are justified by the new technology's strong public benefits. An aggressive and immediate effort to expand domestic production of hybrid cars, and other highly efficient technology will drive new investment toward existing plants and workers today, rather than allowing the market to become dominated by imports and foreign transplants through inattentive policies. Additional market creation incentives, such as the use of federal and state economic development, workforce, and research and development investments will also drive new capital toward traditional manufacturing regions.

Such a significant investment in manufacturing incentives must be backed by predictable and equitable increases in efficiency standards to ensure that environmental gains are realized. Subsidy accountability measures like economic development claw back provisions should also be used to ensure that anticipated job creation and retention targets are realized, and environmental goals a re achieved.

The environmental benefits of moving to high performance vehicles are significant. Through 2020, ACEEE suggests that efficient vehicles can reduce energy demand by 7.7 quads (6% of forecasted consumption).[xxx] In more practical terms, this translates to less drilling and slower depletion of natural resources. There is considerable discussion over the likely amount of displaced petroleum. While a variety of studies have articulated different potentials, they are consistently significant. The Office of Transportation Technology's "Quality Metrics" report, for instance, claims that 1.25 million barrels of daily petroleum consumption can be avoided by 2015 if we adopt more efficient technology in the absence of policy change. Likewise, ACEEE, maintains that over a ten-year period, efficient vehicles could reduce petroleum consumption by 1.1 million barrels per day. After 20 years, further advances could displace 4 million barrels per day, with a program of aggressive regulatory support.[xxxi]

(B.2) Match Strong Appliance Standards with Domestic Investment Incentives

Benefits from Modernize Appliance Standards			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$3.50 Billion	$9.53 Billion	$5.89 Billion	29,876

Appliance standards work. The U.S. Department of Energy estimates that current standards have reduced U.S. electricity use by 88 billion kilowatt-hours in 2000, and by 1.2 quadrillion BTUs overall.[xxxii] By 2020, savings resulting from more efficient appliances will be an estimated 341 billion kilowatt-hours per year, "equivalent to the annual energy use of 23 million American households[xxxiii]", and saving consumers $50 billion over the last decade.[xxxiv] Moreover, there is real job creation potential in appliance standards, through increased labor inputs and improved economic efficiency. Energy efficient appliances use more skilled labor in each product than inefficient appliances; the DOE predicts the creation of 120,000 jobs by 2020 from three standards alone (lighting ballasts, clothes washers, and water heaters).[xxxv] Standards can also be applied to a much wider range of products than those just listed above, products that are not traditionally associated with standards. Traffic lights, vending machines and torcherie lighting can all be made more energy-efficient.

In *Smart Energy Policies,* ACEEE estimated the impacts of broadly applied standards. If Congress were to apply serious standards to a wide variety of products it would reduce national energy use by 2.8%. The resulting emission reductions and energy cost savings are likewise significant. By 2020, appliance standards can avoid 65 million tons of carbon emissions (3.15% of total baseline emissions). At the same time they would save consumer a net $84 billion in energy expenditure.[xxxvi]

Energy experts estimate that environmental concerns justify a $2 billion federal investment in incentives for expanding R&D and manufacturing conversion. Over ten years, this could precipitate $13 billion in private investment.[xxxvii] The Apollo Project applauds this but recommends an additional $1.5 billion package of investment tax credits tied to domestic job retention and conversion costs. Together, the federal $3.5 billion here represents 25% of the incremental $12 billion cost of imposing a broad range of aggressive standards. In all cases this public subsidy should be guaranteed by a requirement to achieve environmental and job creation goals backed by claw back provisions and other subsidy accountability measures.

Pairing increased efficiency standards with new tax incentives for manufacturing conversion and the development of new, even more efficient premium product lines, will address the concerns of manufacturers, while ensuring that domestic manufacturing jobs are retained and real efficiency gains are made. Increasing domestic investment while raising labor and environmental standards makes sense at a time when appliance manufacturers are increasingly moving offshore. Consumer incentives to adopt more efficient appliances, include bounty programs, in which consumers are offered an incentive to trade in old appliances for recycling, can also accelerate turnover of existing durable goods, moving inefficient appliances out of use, and building demand for new and more efficient products.

(B.3) Investing in Manufacturing Energy Efficiency as Tool for Job Retention

Benefits from Manufacturing Efficiency			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$42.00 Billion	$341.01 Billion	$222.88 Billion	741,912

Current energy inefficiency means that US plants have tremendous potential to reduce energy consumption. Reductions of 16% by 2020 are possible,[xxxviii] resulting in savings of (6.4 quadrillion BTUs) and reduced carbon emissions of 132 million metric tons.[xxxix] Recent federal budgets have cut funding for critical manufacturing assistance programs such as the Manufacturing Extension Partnership (MEP) and Advanced Technology Program (ATP). Instead of scaling back these critical programs, they should be strengthened and their activities should be focused on the industrial challenges of achieving energy independence and worker retention.

In the energy intensive paper, chemical, steel, and textile industries, volatile energy prices are a substantial hardship to already pressed domestic producers. Energy innovation can drive down costs through efficiency, it can provide price stability, and it can even create new revenue streams through co-generation and net metering as energy is sold back to the grid. Policies that support environmentally motivated retrofits to plants can drive new capital investment into older factories, helping to retain jobs. Improved industrial boiler operation can be a source of tremendous environmental benefit, and substantial new man hours of high skilled employment. Cleaner factories also mean reduced regulatory pressures. Moreover, industrial efficiency will produce net energy cost savings.

These considerations alone justify additional policies to encourage new investment in clean and highly efficient manufacturing processes. To that extent, we recommend a mixture of incentives and requirements to encourage efficient manufacturing. European Union countries have led the way in the use of voluntary industrial programs that create powerful incentives to improve sectoral energy efficiency. By voluntarily committing to binding efficiency targets, participating firms become eligible for a host of manufacturing assistance programs that improve the overall productivity of the business. These programs are based on federal technical assistance, workforce training, federal grants and expanded R&D and demonstration. Improved energy management increases productivity, reduces costs, create new revenue streams for firms, and open new markets for skilled labor. Continued qualification for these programs, however should be tied to yearly energy demand reductions, and an auditable system for accounting for energy savings.

To promote energy efficiency and industrial modernization, Howard Geller of the Southwest Energy Efficiency Project proposes a 20% investment tax credit to manufacturers that commit to lower energy costs and CO2 emissions by at least 2.5% per year for 10 or more years. The tax credit would be offered to firms that invest in industrial equipment or process control equipment that provide energy savings or reduce CO2 emissions intensity, including investments in combined heat and power (CHP) systems. The proposal also mandates that the companies implement monitoring systems track and report on their energy usage or emissions to demonstrate eligibility for the credit. Geller estimates that the cost of such a tax incentive program to the federal government would be as low as $4 billion per year.

Geller's recommendation is based on the success of the Dutch long-term agreements program. Starting in the early nineties, the Dutch government signed agreements with 1,200 firms in 31 sectors covering about 90 percent of industrial energy use. The agreements mandated an average 20% reduction in energy usage across sectors by 2000 relative to 1989 levels. Companies agreed to draft an energy efficiency plan, invest in new technologies, and report on results. In return, the government provided technical assistance and tax incentives over the course of the agreement. The program reached its 20% goals by 1999.[xl]

Alternatively, the tax code can serve as an incentive for energy saving investments. Depreciation schedules for energy efficiency retrofits and facilities upgrades could be accelerated from 15 to 7 years. This would relax cost barriers to new investments such as co-generation and combined heat and power systems. CHP systems have typical efficiency of 68%, with some new systems exceeding 90% Traditional systems hover at nearly 45% efficiency. [xli] Uniform rules also must govern interconnection for individual power generators. Further, existing economic development and workforce investment programs administered at the Federal, state, and regional level should be fully funded, and specifically directed to support environmental retrofits and skill upgrades for workers in existing plants as a funding priority.

The manufacturing sector is enormously energy intensive. It accounts for 80% of industrial energy use and 80% of industrial greenhouse gasses.[xlii] There are a number of steps available to manufacturers that dramatically reduce energy use. More efficient ventilation and industrial motors, combined heat and power systems and voluntary programs have all proven effective. Voluntary industrial agreements and accelerated tax schedules for CHP systems, for example, can reduce energy consumption and carbon emissions by roughly 7%.[xliii] In addition, we impose a specific allocation of $2 billion over 10 years for efficient industrial boilers and assistance to utilities in deploying scrubbers and other available pollution reduction technology.

Promote High Performance Building

Representing nearly 235 billion square feet,[xliv] buildings account for 70% of total U.S. electricity consumption and 39% of primary energy consumption[xlv], end use of energy in buildings is one of the largest areas of energy demand in the economy. In 2001, buildings consumed roughly 37.6 quadrillion BTUs of energy at a cost of $293.6 billion[xlvi]. Energy efficiency is an important means of meeting demand for the services of comfort, warmth and light that we require in our homes and workplaces. Yet, our built environment remains highly inefficient. Improving financing and providing incentives for the construction and retrofit of high performance buildings can drive an explosion of new investment in high skill construction jobs and demand for skilled ongoing building operations. Improving efficiency is a clear win for workers, consumers, and the environment – using more skilled labor while improving performance and saving money.

(C.1) Improve Financing for High Performance "Green" Buildings

Benefits from Improved Financing				
	Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
Financing	$1.00 Billion	$5.66 Billion	$3.76 Billion	12,607
Public Buildings/ Public Benefits Fund	$10.80 Billion	$126.97 Billion	$85.27 Billion	278,567

The building and construction community has developed a number of techniques, materials, and design strategies that would go a long way toward making more efficient buildings. Green buildings invest more money in upfront construction costs through high quality installation and maintenance of systems, including heating, ventilation, and air conditioning, lighting, and refrigeration. These high performance buildings redirect money from wasted energy into ongoing operations by skilled contractors. In spite of up front expenses, their total cost of operation is lower than that of conventional buildings, because these investments are more than offset by energy savings. In a very real sense, they invest savings from wasted energy into creating jobs for skilled workers. The internal rate of return on these investments is often quite high, with payoffs in only a few years, yet market and institutional barriers have slowed their adoption. Green building incentive programs have proven highly successful in states such as New York and Oregon, and have been widely embraced by the building trades due to their ability to create jobs in construction as well as supporting workers in the service and public sectors.

The Federal Housing Administration's *energy-efficient mortgage (EEM)* program provides full-financing for energy efficiency improvements of up to $4,000 or 5% of the total value of the property (whichever is larger, but with a limit of $8,000). Over time, the energy savings exceed the cost of the loan, providing positive cash flow to the homebuyer. Based on expert opinion and utility customer acquisition costs, a $1 billion allocation over 10 years would be a reasonable to buy down the cost of home improvement loans and provide 0% interest to lenders and create better awareness of the program. At these rates, energy efficient mortgages leverage three times the federal investment.[xlvii]

Public Benefits Funds (PBF) are one of the most effective energy efficiency improvement mechanisms. The fund is collected by levying a small charge on each kilowatt-hour of electricity as it enters the transmission system. The monies collected are used for energy efficiency programs and energy-related initiatives. Many experts estimate that a $.002/ kWh Public Benefits Fund will generate approximately $130 billion in energy efficiency investments over 20 years ($65 billion over ten years). The ten-year treasury cost would be roughly $10.8 billion.[xlviii] While these costs are significant, so are the benefits. Consider that a $.002/ kWh public benefits fund would reduce energy expenditures by a net $101 billion[xlix] by eliminating 5% of national energy consumption. Likewise, a well-administered PBF could reduce carbon emissions by over 1.36% of the 2020 baseline forecast.[l] The fund administrator can also be directed to use a portion of these funds to ensure efficient schools and public buildings. Likewise, a national fund could be used to match state public benefits expenditures.

(C.2) Green Building Tax Credits

Benefits from High Performance Buildings Tax Credit			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$42.00 Billion	$236.53 Billion	$158.55 Billion	527,153

Tax credits that encourage residential energy efficiency retrofits can have enormous impacts on the environment and create substantial man hours of employment. Specifically, a two-tiered approach would offer different subsidies depending on efficiency gains. Homes that achieve 30% increased efficiency would earn $750 and homes that achieve 50% increased efficiency, $2000. Experts suggest that over ten years, the program could induce 70 million retrofits where half achieve 30% greater efficiency and half achieve 50% greater efficiency. Although these calculations are based on residential retrofits, they can be applied to the commercial and industrial sectors. A broader program would have significant benefits, reducing energy demand by an additional 1.4% and carbon emissions by 2.16%.[li]

(C.3) Provide Ongoing Research and Development for Green Building Technologies

Benefits from High Performance Building R&D			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$2.00 Billion	$3.81Billion	$2.63Billion	8,932

Experts at the NRDC note that DOE has a record of effective research spending on energy efficiency. They further suggest that adopting the historic high water mark in building efficiency R&D can greatly advance efficiency, especially if tied to market transformation efforts. That level was set in 1980 when over $170 million was spent on research and development.[lii] In addition to matching historic funding levels, an additional $20 million per year can link technology development to worker training and certification programs in partnership with the DOL. The entire ten year federal investment would be near $2 billion, and yield substantial results.

(C.4) Promoting Improved Building Codes and Standards for New Construction

The American Council for an Energy-Efficient Economy (ACEEE) estimates that revised building codes could effectively save the nation a net of $23 billion by 2020 (after implementation costs of $11 billion), and avoid 1.5 quadrillion BTUs of unnecessary consumption. Energy experts estimate that enhanced codes and standards would produce 10-20% improvement in commercial building efficiency by 2010. Furthermore, nearly half of all new residential construction does not meet the International Energy Conservation Code. Improving efficiency on the remaining residential construction could improve efficiency by 15% immediately, with an additional gain of 20% by 2010.[liii] We propose to allocate $100 million over ten years to develop and transfer energy efficiency standards to the states for enforcement. The $5.5 billion total expenditure represents the incremental cost of implementing those standards. Unionized building and construction trades are uniquely positioned to support the implementation of improved codes and standards as a result of their proven ability to train and certify equipment installers and building operators. Improved adherence to high-performance building practices will increase demand for skilled workers, and increase investment in ongoing building operation and maintenance, while reducing energy consumption and environmental impacts. Updating building codes alone could eliminate 33 MMC of carbon emissions, or 1.6% of the total 2020 emissions forecast.[liv]

(C.5) Supporting Low Income Energy Assistance

Benefits from LIHEAP			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$34.00 Billion	NA	NA	NA

Affordability is a key principle for evaluating an energy policy. While the policies proposed in this larger package should have a strong positive impact on stabilizing energy prices and markets, ensuring basic access to energy, and investing in weatherization and conservation programs for low-income Americans remains essential. The Low-Income Home Energy Assistance Program (LIHEAP) helps provide heating, cooling, and weatherization for the homes of low income people, for whom energy expenses are a disproportionately large percentage of annual income. Although recent versions of the energy bill contained increased funding for LIHEAP over the next five years up to $3.4 billion per year from 2002's historic low of $1.7 billion, funding has remained uncertain. Increased support for LIHEAP – at least to the level indicated in the previous House bill – is simply the right thing to do. Weatherization programs within LIHEAP should also be expanded to help low income Americans, and increase energy savings.

Investing in Public Infrastructure

State budget shortfalls total over $97.6 billion nationwide for FY 2003- 2004.[lv] Metropolitan regions lost 640,000 jobs last year.[lvi] At the same time, urban disinvestment and sprawl have increased energy consumption, as average commutes grow in time and distance, raising pollution levels. Developing a strong policy of urban reinvestment driven by smart infrastructure construction will create good jobs and improved racial and economic justice, as cities focus on improved services, better maintenance, and new intermodal development. Increased construction and infrastructure investment will also create demand for steel and cement, and new opportunities for transit workers, even as it reduces demand for imported oil. Sprawl and urban disinvestment have separated low income and minority residents from areas of job growth, and drained resources for education, government services, and maintenance of existing neighborhoods. Rebuilding our cities will increase the levels of municipal services, and improve job access and mobility for urban workers. Regional transportation planning and infrastructure investment is good energy policy, good environmental policy, and good for America's working families.

(D.1) Brownfield Redevelopment

Benefits from Brownfields Redevelopment			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$3.50 Billion	$9.28 Billion	$6.36 Billion	20,837

Oil imports are driven primarily by automobile use. Gasoline consumption is a product both of fuel economy and the number of vehicle miles traveled. Therefore, an important strategy for reducing dependence on imported oil is to invest in compact livable cities that reduce reliance on automobiles and ensure access to diverse transportation options. Brownfield redevelopment policies encourage reuse of idled and contaminated urban land, contributing substantially to urban density. If redeveloped, the nation's brownfield sites would have a potential market value of $650 billion, creating substantial community economic development as well.[lvii] The Economic Development Administration's funding of brownfield redevelopment and infill projects should be enhanced. The U. S. Conference of Mayors has proposed that Congress direct $250 million per year for brownfields assessment, clean up, infrastructure upgrades, community needs assessment training, low interest loans and demolition monies. A separate proposal, The Brownfield Site Redevelopment Assistance Act 2001 (S.1079) would dedicate nearly $1 billion over ten years to broader site development and clean up.

(D.2) Regional Planning and Smart Growth

Benefits from MPO Support, JARC, Smart Transportation Networks			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$8.15 Billion	$19.74 Billion	$13.19 Billion	50,520

Building a strong program of federal support for regional planning and investment in smart growth will channel large scale new construction projects toward urban centers and areas of higher population density, improving both energy efficiency, and the efficiency of public infrastructure investments. Unmet planning needs total $300 million dollars per year,[lviii] or $3 billion dollars over the next ten years for Metropolitan Planning Organizations. Planning issues such as the regional distribution of affordable housing, tax base consolidation, open space protection, and requirements for citizen participation and union involvement in planning all can have important effects on urban form and long term energy demand. Technical programs for transportation enhancement can also substantially reduce energy consumption and environmental impact. A smart transportation network can help manage the costs of increasing numbers of vehicles on the road, better using existing infrastructure through synchronized traffic signals, incident response demonstrations, and traveler information systems. One-hundred twenty-five million dollars per year would fund development of the FHWA Intelligent Transportation System program. Deployment of existing ITS technologies would cost an additional $140 million annually.[lix] Better information is also key to sound planning, studies of issues like freight capacity, environmental concerns, and transportation equity help state and local transportation authorities identify and deal with issues that effect the community. We believe that $100 million annually is a reasonable dedication for expanded research.[lx]

The $150 million Job Access and Reverse Commute (JARC) program helps low income working families in central cities to reach jobs in throughout the regional labor market. The costs of the program are modest and the social and environmental Benefits are clear and substantial. Yet, current budget proposals have slashed spending on this critical program. In addition, funding guidelines are being dismantled while the program is in danger of loosing its autonomy. The Apollo Project asserts that administrative funding guidelines should be preserved, as well as JARC's status as a stand-alone transit program. This program should be fully funded over the lifetime of the Apollo Project, yielding $1.5 billion in federal investment.

(D.3) Subsidy Accountability Measures

All of these planning and growth policies have important long term effects on the shape of our communities and their energy usage, as well as on the structure of labor markets – creating opportunities for the working poor even as they reduce the use of imported foreign oil. State and local "clawback" provisions that make subsidies conditional on achieving promised development outcomes are also key tools for managing growth in the public interest. Subsidy disclosure laws and reporting systems should also be developed both at the national and state and local level, to ensure that public expenditures really produce desired public benefits. Within the context of the tax incentives and subsidies proposed in this package, it is critical that accurate measures be established to track energy and employment gains, and that systems of accountability be developed to match the robust public investment in energy independence. Community Benefits Agreements are another powerful tool for ensuring that issues of community and economic justice are advanced by economic development efforts. CBAs link public subsidy in the development process to specific community enhancements that benefit the broader community. Supporting state and local revitalization through smart growth and public investments subject to accountability, can benefit public workers, transit workers, and the construction trades, as well as strengthening community alliances for social and economic justice.

(D.4) Reducing Vehicle Miles Traveled with New Transit Starts

Benefits from Transit Starts			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$20.00 Billion	$50.07 Billion	$33.33 Billion	141,112

Investing in transit infrastructure is a sound strategy for economic growth. Helping people get where they need to go efficiently and rapidly increases the efficiency and regional competitiveness of metropolitan economies. Developing effective, multi-modal systems of transportation is also the backbone of achieving smart growth: transit is good for labor, the environment, and urban working families. A 1998 survey of proposed transit projects in TEA-21 identified $81 billion dollars of new transit spending needs that were lacking in federal matching funds, yet new transit starts are funded at only $1.2 billion per year. The American Public Transit Association (APTA) recommends that new start funding be increased to $11.68 billion over six years to meet existing demand. The Apollo Project supports new transit investment as a critical form of infrastructure for reducing long term energy demand, improving job access, and promoting strong labor markets. Funding new transit starts at the level proposed by APTA over ten years to reduce backlogs is a necessary step in achieving energy independence.

(D.5) Regional High-speed Rail Investments

Benefits from High Speed Rail				
	Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
New High Speed Rail	$25.00 Billion	$63.37 Billion	$42.85 Billion	179,008
Rail Maintenance	$8.00 Billion	$21.96 Billion	$15.06 Billion	60,248

Regional high speed rail offers further opportunities for focused economic development, union job creation, and healthy environmental impacts. A number of regional high-speed rail networks have been proposed, including a nine state Midwestern project surrounding a Chicago hub, which would include 3,000 miles of upgraded track. A study of the project's impact predicts 2,000 permanent jobs and 4,000 construction jobs, as well as the potential for further economic development along the rail corridor and reduced pollution.[lxi] In addition, regional rail corridors are in advanced stages of planning and development between Los Angeles and Las Vegas, and linking Miami, Orlando, and Tampa. The High Speed Rail Act of 2002 "Ride 21" proposes funding levels of $25 billion dollars for such regional high speed rail projects. These investments should be strongly supported as part of a sound energy policy, since rail is one of the most energy-efficient ways to move people, on a passenger-mile basis. In addition, rail networks and inter-modal transportation generally should be protected by preserving Davis Bacon Protections, and maintaining 13C transit labor protections,[lxii] as well as by maintaining the federal 80/20 match on new transit starts. Currently, Amtrak faces a budget shortfall of $8 billion over five years to meet the maintenance needs of high speed rail routes in the Northeast Corridor. This funding should be sustained to preserve existing regional transportation investments and meet the growing need for mobility. The vulnerability of the air travel system post-911 makes investment in rail a priority, as national security demands transportation flexibility.

(D.6) Invest in Existing Road Maintenance

Benefits from Road Maintenance			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$5.00 Billion	$14.38 Billion	$9.78 Billion	38,386

Transportation policy affects the number of vehicle miles traveled and consumption of petroleum. We should invest in a sound long term energy independence plan by fully supporting the rebuilding of our transportation networks for inter-modal smart growth, to reduce congestion, improve maintenance, and increase job access and mobility for all Americans. The nation has tremendous unmet needs for maintenance of existing highways, roads, and bridges. Maintenance is labor intensive; most of the money spent on maintenance goes to wages rather than materials or capital costs. Yet, under existing (funded) transportation programs, states are under-spending their maintenance budgets in every category, which is hurting workers and communities that could be benefiting from this maintenance. To that end, the Apollo Project proposes a $5 billion allocation over ten years to aid in critical infrastructure repair and maintenance. This is intended to fund 80% of the total repair costs. These funds should be block granted to states and metropolitan regions on the basis of demonstrated needs, and targeted towards projects that reduce congestion in improve local mobility, such as road maintenance and bridge repair.

(D.7) Congestion Mitigation and Air Quality

Benefits from Road Construction			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$18.00 Billion	$44.75 Billion	$29.77 Billion	126,080

Congestion mitigation and air quality (CMAQ) expenditures should be significantly increased to meet the growing demand for environmentally motivated construction and infrastructure projects in growing metropolitan areas. CMAQ expenditures support new highway construction projects that improve the quality and environmental performance of our infrastructure. Workers and communities benefit from investing in the maintenance and upgrading of existing infrastructure and by improving transportation choices. AASHTO recommends that the federal government increase its CMAQ funding levels to $11 billion over six years.[lxiii] This is a reasonable allocation based on clearly identified community needs. Extending this program for the ten year time horizon of the Apollo plan, results in a funding level of $18 billion. Infrastructure investments must preserve worker protections like Davis Bacon prevailing wage laws and should promote worker training. In this way, the solutions to energy and transportation problems can also have far-reaching effects on social equity and improve opportunity for working families.

(D.8) Upgrade Municipal Water Infrastructure for Energy Efficiency

Benefits from Water Infrastructure			
Ten Year Federal Investment	**GDP Gain**	**Personal Income**	**Total Jobs**
$11.50 Billion	$28.91 Billion	$19.51 Billion	62,586

In the United States, the water and wastewater sector annually consumes 75 billion kilowatt-hours or 3% of total electricity consumption, equal to the total electricity consumed by the pulp and paper and petroleum sectors.[lxiv] However, much of this energy is wasted due to deferred maintenance, poor system design, outdated pumping systems, and other inefficiencies. Insufficient access to investment capital is the primary barrier to implementing these energy-saving policies.[lxv] Without the necessary funds to install monitoring devices, improve basic maintenance, identify leaks and malfunctioning equipment, upgrade pumps, reduce waste of usable water, and improve system layout, these very substantial efficiencies remain unrealized. A 20 year proposal for $23 billion was included in a wastewater modernization bill last Congress.[lxvi] The Apollo Alliance agrees that $11.5 billion should be spent over ten years to meet the demonstrated wastewater needs. Funding should be prioritized towards expenditures that will obtain the greatest energy efficiency gains. These are wise investments – estimated efficiency gains range from 15 to 25%.[lxvii] This spending will go directly toward strengthening the fiscal position of cities, will benefit public workers and consumers, and it will have a direct and dramatic impact on energy consumption. Moreover, it will help reverse pressures for costly and shortsighted privatization of public infrastructure, which can drive down both labor and environmental standards.

SETION 4: A New Apollo Project

Benefits to the Nation

The Apollo Project meets pressing challenges to our economy, environment, national security and public infrastructure by promoting clean energy in what the Perryman Group economists call "a productive and mutually beneficial manner." The Apollo policy program (1) jump starts our economy, (2) creates good jobs (3) offers substantial benefits for the environment, (4) revitalizes our cities, and (5) improves national security. The following section addresses each of these benefits in turn.

1. The Apollo Project Reinvests in our Economy

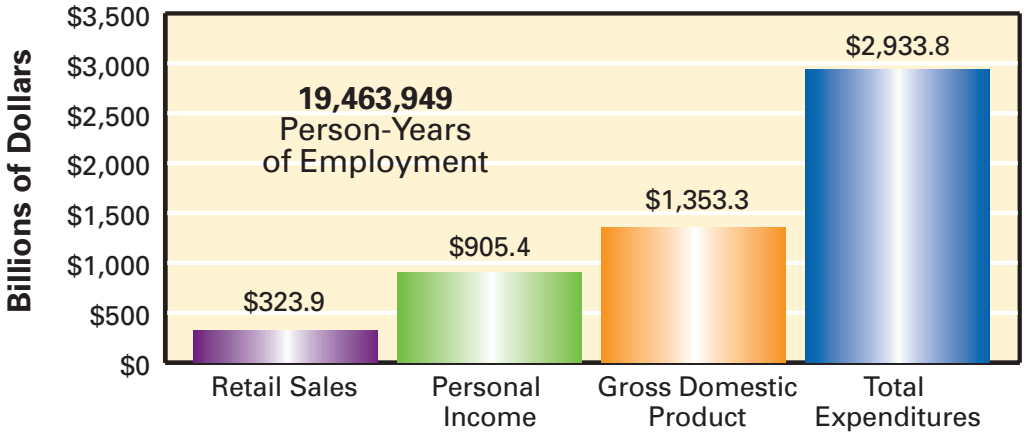
When the contribution of an Apollo investment plan is analyzed from a proper and complete perspective, it is clear that the plan results in substantial gains to the national economy. **Combining the effects of these investments** yields the following totals (over a 10-year period).

- ✓ $2,933.8 billion in Total Expenditures;
- ✓ $1,353.3 billion in Gross Domestic Product;
- ✓ $905.4 billion in Personal Income;
- ✓ $323.9 billion in Retail Sales; and
- ✓ 19,463,949 Person-Years of Employment.

Stated alternatively, the project sustains $293.4 billion per year in spending and 1.946 million jobs as a result of its developmental activity alone.

Over the life of this proposed initiative, federal tax revenues are stimulated by $238.6 billion, or about 79.4% of the initial outlays. This funding thus facilitates a substantial recoupment of the fiscal expenditures even before the ongoing benefits and activities are examined, reducing the dynamic costs of the Apollo Project to only about $62.0 billion. When the incremental permanent benefits that begin occurring during the development phase are factored into the analysis, the project is actually self-funding over its initial ten-year implementation period.

Total Economic Impact of Investments in Apollo Project Initiatives Over a Ten-YearPeriod



Source: The Perryman Group

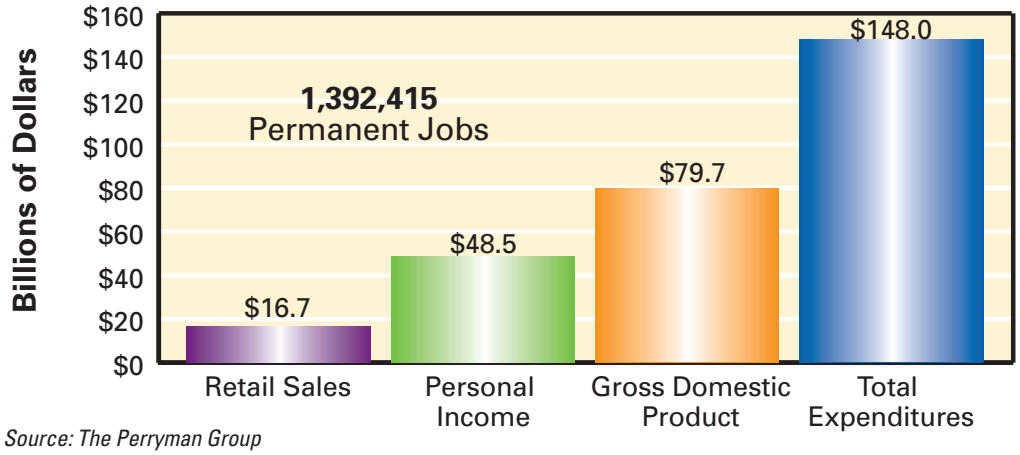
Ongoing Stimulus

The **ongoing stream of stimulus** surfacing as a direct result of this significant investment program includes:

- ✓ $148.0 billion in annual Total Expenditures;
- ✓ $79.7 billion in annual Gross Domestic Product;
- ✓ $48.5 billion in annual Personal Income;
- ✓ $16.7 billion in annual Retail Sales; and
- ✓ 1,392,415 Permanent Jobs.

The flow of activity further enhances fiscal revenues by $13.8 billion per year, thus representing, a 22.3% annual rate of return when the dynamic effects of the developmental phase are factored into the analysis. Moreover, assuming these benefits begin to partially occur over the course of the implementation phase in a standard, compounded growth fashion, this brings an additional $68.2 billion in federal revenues during the initial ten years of the project. **When coupled with the funds from the development process ($238.6 billion), the total return to the federal government is $306.8 billion relative to an overall investment of $300.6 billion.**[lxviii] Thus, the Apollo Project is essentially self-funding over the course of the initial investment and generates sizable ongoing fiscal benefits thereafter.

Total Ongoing Annual Economic Impact of Apollo Project Initiatives



Source: The Perryman Group

Added Potential Economic Impacts:

Two additional modeling exercises were conducted as thought experiments by the analysts, to examine the potential benefits of an Apollo Project of federally led investment if it helped the US economy achieve a position equal to the global average, (1) in terms of clean energy production, and (2) in restoring the contribution of the manufacturing sector to world average levels as a percentage of overall economic output.

1) If this initiative is able to encourage a **level of participation in the clean energy segment equal to the US proportion of global energy consumption,** the incremental enhancement over currently projected patterns in 10 years are estimated to include the addition of some $17.6 billion in annual Gross Domestic Product and 187,413 Permanent Jobs.

2) The programs embodied in the Apollo Project represent an opportunity to capitalize on multiple markets on the brink of phenomenal growth. Moreover, the research, technologies, products, and methods represent a unique fit in the American economy. They involve higher value added and, hence, higher-paying employment. These top-quality jobs are necessary to offset the increasing loss of manufacturing jobs in lower technology segments and to create opportunities for a new era of expanding production capacity. **If the US were, over 20 years, to achieve the level of manufacturing concentration which is typical of world economies,** the impact at the halfway point of the postulated scenario (after 10 years of the Apollo Project) would result in gains of $1.7 trillion in annual Gross Domestic Product and 21,862,371 Permanent Jobs.

Annual fiscal revenues of $301.8 billion will also be generated and the expansion path will continue beyond that point. Even at this level, the yearly influx to fiscal coffers exceeds the entire 10-year commitment required for the proposed Apollo Project, and the annual rate of return on a dynamic basis is 487.1%. While it would be inappropriate to attribute a renaissance of this nature in US manufacturing to any single initiative, this scenario illustrates the enormous possibilities for a sustained program of modest investment in promoting expansion in energy efficiency, environmental quality, and emerging industry competitiveness. To restore US manufacturing to global levels, will require a balanced program of trade, health care, economic development, research, and investment policies. Apollo can be a central part of such an effort. Clearly the benefits would be substantial.

2. The Apollo Project Creates High-Skilled, High Wage Jobs

The New Apollo project stands in contrast to other job creation programs because it is explicitly focused on creating good high skilled jobs. The industries necessary to meet the goals of Apollo on average pay higher wages and provide benefits such as health care and retirement benefits. Access to capital and stable markets will lower the risk of investments for employers, spurring growth in those sectors.

Building for Energy Diversity Will Create Skilled Manufacturing and Construction Jobs

Renewable energy is a strong engine for job growth. Diversifying our energy resources can provide significant economic benefits. Seventy-thousand MW of wind alone will be put on line over the next decade, representing $75 billion in new business and new jobs.[lxix] Renewable energy is more labor intensive than equal investments in traditional generation. Renewable energy is a young industry experiencing rapid growth, wind is the fastest growing energy source and the solar industry is growing above 25% annually.[lxx] And unlike traditional fuels, renewable energy invests in domestic resources and local construction jobs, keeping regional economies strong. Increasing the use of renewable energy reduces demand for natural gas, stabilizing prices; as a result expanding energy diversity can be part of a broader manufacturing retention strategy focused on managing energy costs. Cleaning up existing power plants also creates significant employment – good jobs operating industrial boilers and installing and operating pollution abatement equipment.

Increasing energy diversity through renewable energy will stimulate significant employment in both the construction and manufacturing sectors. According to a study by the California Public Interest Research Group, Renewable Energy generates four times as many jobs per MW of installed capacity as natural gas[lxxi], while the Renewable Energy Policy Project finds that renewables create 40% more jobs per dollar of investment when compared with coal fired plants.[lxxii] Renewables policies create markets and spur new private investment. Wind farms utilize large amounts of steel and because of the size and scale of these projects, offer competitive advantage to local manufacturing, while solar energy increases the demand for skilled installers. Renewables incentives have been linked to a wide range of policy tools for improving regional labor markets, including union apprenticeship programs, skill standards and certification, prevailing wage laws, and local manufacturing incentives.

Investing in Energy Efficiency Will Create Skilled Jobs

Energy efficiency create good jobs in a number of ways. The costs of energy efficiency are primarily spent on local construction and new manufactured commodities. As a result efficiency creates 21.5 jobs for every $1 million invested, compared to 11.5 jobs for new natural gas generation.[lxxiii] These jobs are in skilled installation as well as ongoing operation and maintenance of building systems. Energy efficiency is also good for public workers who can realize substantial savings, freeing money from public budgets to fund teacher salaries and increased service levels. Finally, efficiency offers real savings to consumers, meaning that working families have more money to spend on other goods and services within their local economies rather than spending money on expensive energy imports that drain local resources.

The potential to greatly increase our overall efficiency should be seen as a tremendous opportunity, especially for jobs in the building and construction trades. Skilled construction workers will be called upon to retrofit our offices, homes, institutional buildings and manufacturing plants. In order to maximize this opportunity, policies will have to be established that make reinvestment in our built environment a possibility, such as preserving public benefits funds and creating new financing options. New technologies and new controls will open new jobs for skilled trades and create opportunities for training and career ladders low-income workers and non-traditional construction workers as project labor agreements and apprenticeship utilization requirements create opportunities for workers to enter and succeed in the trades.

Energy efficiency projects have a ripple effect through the economy because they lower overall dependence on energy and lower the costs paid by businesses and governments. According to the American Council for an Energy-Efficient Economy, a combined approach of renewable energy and energy efficiency could reduce wholesale natural gas prices by 22%, reducing natural gas demand by 4.1%, and saving consumers $75 billion in just five years.[lxxiv] Instead of spending money on wasted energy and driving up demand, more efficient energy use and greater diversity direct investments into good jobs based in local communities.

Investing in New Industries Will Sustain Good Jobs for the Future

New energy investments will help to revitalize manufacturing by stabilizing energy costs, driving new capital investment into existing firms, and by creating demand for new manufactured goods. Accelerating capital stock turnover through policies that encourage building retrofits increases demand for new energy efficient appliances and other manufactured goods. Policy tools like investment tax credits and accelerating depreciation of assets can drive new investment into older plants and existing workers, and ensure that benefits are retained domestically. Renewable energy policies can be used encourage domestic industries to supply new manufactured goods such as wind turbines, fuel cells, and solar arrays, and treated as a part of the larger economic development system. Many Apollo policy changes will also improve access to capital, create more secure domestic markets, and offer greater certainty that investment in research and development will be rewarded in the market place. Increased infrastructure investments and new more efficient construction will also demand more basic manufactured goods like steel and concrete, boosting domestic demand for these key manufactured products and the basic industries that support them.

Infrastructure Investments and Good Jobs

Transportation infrastructure improvements will create good jobs. New transit starts, maintenance of the nation's passenger train system, regional high-speed rail networks, and improvements in the nation's roads and highways to mitigate congestion will generate jobs for the construction industry and in manufacturing. As with green building efforts, many of these initiatives will be public investments covered by prevailing wage laws and project labor agreements that will guarantee good pay for skilled workers. Skill certifications and training programs are already present in many of the sectors where this work would take place, creating opportunities for workers just entering the workforce or looking to move from low-income employment. These changes will improve workers lives in other ways by providing greater transportation choices, improving job access by linking where people live to where they work.

3. The Apollo Project Helps the Environment

Developing clean energy and increased efficiency across the economy will help Americans to move beyond the false choice between protecting the environment and human health, or creating jobs and a growing economy. The Apollo Project works to render that conflict over the use or preservation of natural resources a relic of the last century.

Energy Diversity Reduces Pollution

Apollo will ignite economic growth by investing in the development of new technology that reduces pollution from the energy sector; by increasing the energy efficiency of our cars, appliances, factories, and buildings; and by developing less sprawling cities and towns with better transportation choices. Implementing the Apollo Project will have broad benefits for the health of America's environment, her communities, and her people, beginning immediately, and increasing over the long term. Quite simply, the Apollo Project and a clean energy economy will save lives, revitalize urban areas, and protect our land.

Some experts claim that air pollution now kills more Americans than car accidents every year. The Apollo goal of energy independence in one generation, will substantially reduce environmental impacts from energy, across the economy. By achieving 15% of our electric generation from non-polluting fuels like wind, solar and other clean energy sources, and reducing emissions from traditional energy sources, the move to renewables and cleaner technology will also decrease air-borne mercury pollution in rivers and lakes that has been identified in 35 states.[lxxv]

Reducing our nation's oil dependence, and decreasing the spiraling demand for natural gas will protect America's undeveloped wild lands and coasts from spills and other damage. Saving energy will also give us more benefit and less pollution from the power we do use.

Energy Efficiency Reduces the Escalating Demand for Power

Efficiency works. Appliance efficiency standards, a key conservation mechanism, reduced electricity use in the United States by 2.5% in 2000. By 2020, experts estimate that these standards will save nearly 8% of electricity, enough energy to power 23 million homes for a full year.[lxxvi] Even more stunning, studies indicate that a host of policies like those outlined in this Model Investment Agenda, including modern-

ized building codes, improved financing for efficiency projects, aggressive tax credits for home retrofits, and support for well administered public benefits funds, could together reduce total national energy demand by16%.[lxxvii]

Applying the principles of smart growth to rebuilding cities and developing new communities and transportation networks that are less auto-dependent will cut the number of vehicle miles traveled, reduce gridlock, save green space and eliminate a significant amounts of tailpipe emissions – pollution the EPA has linked to nearly half of all cancers caused by outdoor air toxins and scientists have linked to global environmental concerns.

In sum, implementation of the Apollo Model Policy Agenda could:

- Reduce national energy consumption by 16%[lxxviii]
- Produce $284 billion in net energy cost savings[lxxix]
- Reduce transportation related petroleum consumption between 1.25 million barrels per day[lxxx] and 2.55 million barrels per day,[lxxxi] or the equivalent of cutting Persian Gulf imports by between 54%[lxxxii] and 110%[lxxxiii]
- Place 91 million advanced performance vehicles (38% of fleet) on the road by 2015[lxxxiv]
- Meet 15% of electricity demand through renewable resources by 2015, placing the nation on track to achieve 20% of electricity from renewables by 2020
- Reduce carbon emissions by 23%[lxxxv]
- Reduce SO2 emissions by 28%[lxxxvi]
- Reduce NOx emissions by 13%[lxxxvii]

Investing in Apollo Can Improve Environmental Health

The economic model that forms the foundation of this policy analysis was not designed to calculate the health or environmental impacts of cleaner energy, but comparison with similar studies that model environmental impact indicate that significant environmental gains and emission reductions will be achieved by dramatically improving efficiency, and promoting rapid deployment of new energy technology. A closer look at the health consequences of air pollution provides perspective on the scope of the problem and suggests that we can no longer afford to pollute our air and water.

Nearly half of all Americans live in places where the air is so polluted that simply breathing outdoor air can trigger asthma attacks, heart disease and even death. This pollution is especially harmful to children, senior citizens and people who suffer from respiratory diseases, and in the most polluted cities, lives are shortened by an average of one to two years. Air pollution is responsible for the death of 30,100 Americans a year according to the Harvard School of Public Health and the American Cancer Society.

Asthma rates are now 3 times higher than they were 20 years ago. Implementing existing best available technology in the utility sector could be reduce health impacts by 75%. Hybrids and advanced vehicle designs can play a critical role in reducing smog. Automobiles have significant potential for efficiency gains. By 2015, more efficient vehicles could reduce oil use roughly equivalent to the total amount imported from the Persian Gulf today. [lxxxviii]

Anticipated technology, like fuel cell vehicles operating on hydrogen stored on-board the vehicle can produce zero pollution if run on hydrogen derived from non-emitting energy sources. While generating 15% of our electricity with renewable resources would eliminate roughly 13% of electricity sector carbon emissions (96 million metric tons), 6% of nitrogen oxide emissions and 5.45% of mercury emissions, improving the environmental impact of the entire sector, and benefiting workers throughout the industry. [lxxxix]

This look at the health consequences of air pollution demonstrates both the dangers of not changing our energy strategy, and the rewards of cleaner technologies, policies and practices. Providing better alternatives means more than saving energy, creating good jobs, or cutting costs – it means saving lives, raising the quality of life for millions of Americans, and meeting our responsibility to preserve the environment at home and abroad.

4. The Apollo Project Revitalizes Inner Cities

More than half of the population of the US lives in cities and their inner ring suburbs.

But for more than half a century the economic and social health of the urban core has been eroding due to the ongoing process of suburbanization. As incomes rise, workers move out of the urban center, to heavily subsidized development outside metropolitan areas, taking with them their contribution to the urban economy and also their contribution to the city's tax base. Suburbs as they grow more stable increasingly resist returning an economic contribution to the downtown, further reduced tax bases. As a result the costs of essential local services and infrastructure maintenance increasingly fall on those who remain behind within the urban core. As a result, downtown services deteriorate. The urban core becomes less attractive for both commercial and residential development, and jobs disappear. Residents who remain are left with fewer options for local employment or long commutes to jobs in the suburbs. The process exacerbates social problems increasing unemployment, increasing crime, poorer health, and degrading public infrastructure.

Apollo Can Help Alleviate State and Local Fiscal Crises

To make matters worse, America's cities and metropolitan regions are facing their worst fiscal crisis since World War II. According to a survey being conducted by the National League of Cities, 75% of the 36 states responding so far have significantly reduced local aid for the fiscal year that began July 1. With states predicting more budget crises in 2005, the process is likely to continue. Budget cuts have meant service employee layoffs, declines in social services, and failure to update inefficient and aging infrastructure. Further, the crisis in American cities extends to issues of urban sprawl. Consider the following:

- State budget shortfalls total over $97.6 billion dollars nationwide for FY 2-3-2004,[xc] while metro regions lost 640,000 jobs last year alone.[xci] Public workers face increasing pressure for privatization and cutbacks while communities face declining public services.
- Cities and their metro regions face $1.6 trillion of neglected physical infrastructure needs according to the American Society of Civil Engineers. Unmet needs include school construction and repair, transit investments, and water and sewer maintenance, which could improve efficiency and save tax payer energy costs.
- In 68 urban areas, congestion cost US travelers 6.8 billion gallons in wasted fuel and 4.5 billion hours of delay.[xcii] Sprawling development costs a household $630 more per year and produces eight more tons of CO2 emissions. Residents drive three to four times more and can waste up to three times more energy from driving than those living in efficient, well-planned areas, with more transportation options.[xciii]
- Apollo will generate 3.3 million jobs, returning over $300 billion in federal tax revenue over ten years, create over $280 billion in energy cost savings that will pass on to working families, and divert money from energy exports back into local economies.

Apollo Will Bring Good Jobs to the Inner City

The Apollo project can serve as part of a solution to the crisis of our cities. Cities waste hundreds of millions of dollars each year in energy costs that could be saved if they applied energy efficient technologies that are currently available. We could achieve tremendous savings by retrofitting existing residential and commercial structures, providing attractive alternatives to auto transport, and increasing the energy efficiency of our industrial base. These savings would more than pay back the initial investment.

By increasing capital investment, and renewing public investment in infrastructure, the new Apollo Project will translate into substantial job creation for our inner city communities. Retrofitting downtown buildings would bring high quality jobs closer to the communities that have been cut off from the labor market for those jobs. It would open up new career opportunities in the building and construction trades for residents of downtown neighborhoods, where communities of color have been largely concentrated in the wake of urban flight. It will create a demand for skilled workers, and promote the apprenticeship and training programs, necessary to meet skill certifications, that open careers for workers. Apollo is a strategy for reinvesting in people and communities. It will improve job access, promote economic and environmental justice, and revitalize the base of family supporting jobs in urban communities.

Apollo will create jobs in construction, manufacturing, transportation, building and maintenance. And by modernizing our industrial base, it will save millions of jobs in manufacturing that are now at risk to foreign competition. Historically it is this base of good manufacturing and construction jobs that have provid-

ed a reliable ladder into the middle class for urban and particularly minority workers. Unlike many of the service sector jobs that are replacing manufacturing jobs, Apollo jobs will be in sectors of the economy that tend to pay a living wage and offer health, retirement and other family supporting benefits.

Because of the broad based nature of the Apollo investment plan, it will benefit working-class families in African American, immigrant and white communities, as well as providing good jobs for engineers, designers, planners and other professionals. Apollo refocuses national attention on the importance of public institutions and collective action for overcoming shared national challenges, and launches a program of reinvestment that will profoundly benefit the health, economy, and quality of life in our nation's urban communities.

5. The Apollo Project Improves National Security

The United States' reliance on imported oil and other unsustainable sources of energy poses threats to national and global security. After the Arab oil embargo in the 1970s, the Pentagon commissioned a study to evaluate the vulnerabilities in our energy infrastructure. The study concluded that America's energy infrastructure was vulnerable, in part, due to reliance on imported oil and lack of energy diversification. Recently, many experts have noted that money for imported oil has gone to fund terrorist organizations and that America's reliance on imported sources of energy heavily influences our foreign policy objectives.

Throughout recent history many military undertakings have been motivated, in part, by access to oil reserves. Part of Germany's calculus for invading the Soviet Union in 1941 was to gain access to the oil-rich Caspian Sea energy basin. Japan was, in part, motivated to attack the United States in 1941 over the American decision to maintain an oil embargo on Tokyo. A major reason for military action in the first Gulf War is likely that the world's major world powers were concerned that their access to cheap Middle Eastern oil was in danger. Given that fossil fuels are located in geographically focused areas, namely the Middle East, Central Asia, Western Africa, the North Sea, and certain parts of South America and southern Asia, control over these energy-rich regions inevitably becomes a source of conflicts for states that need access to more energy than their current energy supplies can provide.

Imported energy has also given rise to a new, pernicious security threat – terrorism. Two-thirds of the world's oil and natural gas reserves lie in the Middle East and Central Asia, a region dominated by unstable and undemocratic nations, and fraught with challenges from Islamist extremism and organized terrorism. The terrorist group Al Qaeda has received a substantial financial boost from the region's oil wealth. Osama bin Laden's own personal fortune is founded on oil.[xciv] This is not to say that terrorists themselves own or sell the Middle East's energy reserves, but terrorists indirectly receive hundreds of millions of dollars from financial intermediaries that, in turn, are largely funded by the sale of oil and natural gas.[xcv]

Lack of Diversity in US Energy Sources Leaves us Vulnerable

The United States currently derives 86% of its energy from fossil fuel, much of which is imported in the form of petroleum and natural gas.[xcvi] The United States has not developed a comprehensive energy policy that seeks to enhance diverse local energy sources, making use of new technologies such as solar, wind, biomass, incremental hydropower, and other resources. Without more diversity, the US is vulnerable to weakness in the oil infrastructure, such as security threats to pipelines and volatile diplomatic relationships.

The United States needs to diversify its energy sources, and improve national energy efficiency through investments in new technology, improved infrastructure, and better operations and maintenance. Better policies and incentives to support diversity and efficiency, will improve national security, energy stability, and system reliability.

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