# The Obama-Biden New Energy for America Plan: Existing Technologies Contribute to Energy Goals

*By Robert S. Giglio, Director of Global Marketing and Strategy for Foster Wheeler Global Power Group*

ABSTRACT

Diversifying energy sources is a key goal set out in the Obama-Biden New Energy for America plan. Reducing the nation's dependence on oil has been called one of the greatest challenges our nation has ever faced. Quick and bold actions were proposed to transform the entire economy, "from cars and fuels, to factories and buildings." At the same time, the plan recognizes the potential for dire consequences resulting from climate change caused by greenhouse gas (GHG) emissions, largely from the burning of fossil fuels for energy. Recognizing the nation's responsibility to be part of the global climate change solution, the plan set ambitious goals to reduce GHGs by 80 percent by 2050.

Since taking over the reins of power, the new administration has proposed a comprehensive plan to invest in alternative and renewable energy, end our addiction to foreign oil, address the global climate crisis, and create millions of new green energy jobs. Supporting the administration's goals, the President's budget includes more than $150 billion over 10 years in clean energy and energy efficiency, and a 10-year commitment to make the Research and Experimentation Tax Credit permanent. The funds support the administration's position that investments in research and development today will pay off in high-quality green jobs tomorrow.

Despite the positive steps taken, the overall energy policy goals are extremely ambitious, and it is questionable whether the programs

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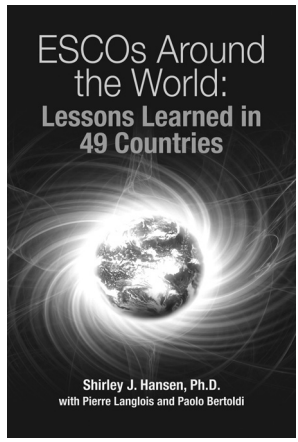


*Shirley J. Hansen, Ph.D.*
*with Pierre Langlois and Paolo Bertoldi*

This book provides an insightful assessment of today's ESCO (energy services) industry around the world, analyzing current trends – both by geographical regions and in specific countries. Both opportunities and barriers/problems are presented and explained by in country professionals who have broad knowledge of their specific ESCO industry. The book includes significant contributions by Pierre Langlois and Paolo Bertoldi. The author and contributors have reached into the far corners of the world to get trusted colleagues to tell the story of the energy services industry's development in their respective countries, and in their own words. Chapters cover selected countries from Western Europe, Eastern Europe, Africa, the Middle East, Asia, North America, South America, New Zealand and Australia, as well as the overall global picture.

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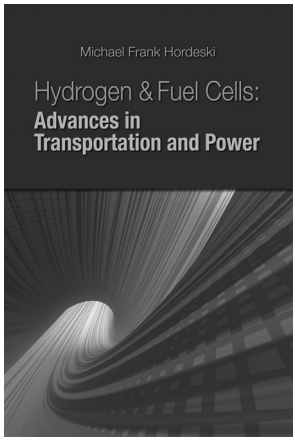


*Michael F. Hordeski*

The hydrogen car has been proposed as the solution to our oil problems, but how would it work, and what potential problems associated with it? This book attempts to address these questions, and to provide specifics about current developments toward a hydrogen-based energy infrastructure. In a major push to establish and commercialize fuel cell technologies, most major auto manufacturers are investing billions in development programs. A less public, but perhaps more important development is occurring in stationary power sources that use fuel cell technology. What would a hydrogen infrastructure look like? Fueling stations could be small electrolysis plants that produce hydrogen from water. Photovoltaic cells could also be used at fueling stations to power for electrolysis. Hydrogen fueling stations have already opened in California, Washington, DC, and Europe. The technology is being pushed by economics as oil prices continue to rise with dwindling supplies. This book offers the reader an informed look at the current state of fuel cell power and transportation technology, and where it's headed.

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outlined so far will be able to meet them. Perhaps even more of a concern, the faltering economy complicates discussions about investment in clean energy and reducing GHG emissions. The deep recession is leading to calls for caution, as some voices say that President Obama must strike a balance between stimulating the economy in the next few years and investing in the long-term future of the environment.

Obama's plan addresses a broad range of energy sectors, but the one area where this subject hits closest to home—literally—is in the way we generate electricity for residential use. As shown on Figure 1, coal remains the lowest-cost energy source for U.S. residences, and care must be taken not to take any actions that increase energy prices at a time when investment and growth is needed to stimulate the economy.

How can we reconcile the important goals of diversifying energy sources, reducing the impact of climate change, and promoting economic growth? One way is to focus on existing ways to reduce environmental impacts on current technologies, while improving these technologies so they evolve into long-term solutions for reducing GHG emissions.

Dr. Steven Chu, Secretary of Energy, stated before the Committee on Energy and Natural Resources in January 2009, "It is now clear that if we continue on our current path, we run the risk of

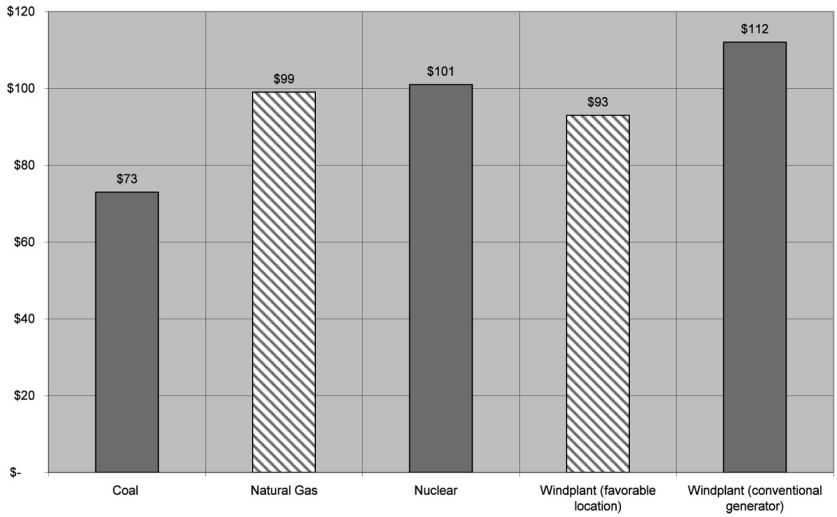


**Figure 1. Monthly residential energy bill by energy source**

dramatic, disruptive changes to our climate system in the lifetimes of our children and grandchildren. At the same time, we face immediate threats to our economy and our national security that stem from our dependence on oil."

"A greater investment in technology [is needed] to capture and store carbon emissions from coal-fired power plants," stated Dr. Chu, who continued his speech by highlighting clean coal as a necessary element in planning for our future.

Circulating fluidized bed (CFB) technology is an example of existing clean coal technology, which Dr. Chu called an essential component in a successful energy plan. CFB technology dramatically reduces emission of harmful pollutants and can cleanly burn traditional coal fuels, as well as "carbon neutral" biomass fuels. A CFB plant built to burn a combination of traditional fuels and several types of biomass fuels can substantially reduce GHG emissions while still producing affordable electricity to meet the nation's needs in this time of economic uncertainty. New upgrades to CFB technology have the potential to transform it into an innovative long-term carbon capture and storage solution, ready to take its place as a clean coal technology called for in the New Energy for America plan.

## NATIONAL AND INTERNATIONAL ENERGY DEMANDS

Our country's struggle to diversify its energy sources is taking place as part of a global energy picture in which demand for electricity is growing as living standards improve and the population increases. The U.S. Department of Energy, Energy Information Administration (DOE/EIA) forecasts that energy demand between now and 2030 will increase by a half, with two-thirds of the new demand likely coming from developing nations.

To meet the existing demand for electricity, and the likely tremendous future demand, we will need to tap deeper into all of the world's primary energy sources, including nuclear, natural gas, coal, and renewables. The EIA forecasts show that, in the approaching years, more coal and more natural gas is likely to be used than other sources. Nuclear energy will be constrained by the length of time it takes to build plants (and get the regulatory approvals) and by perceived safety concerns. Biofuels and renewable alternatives (i.e., wind and

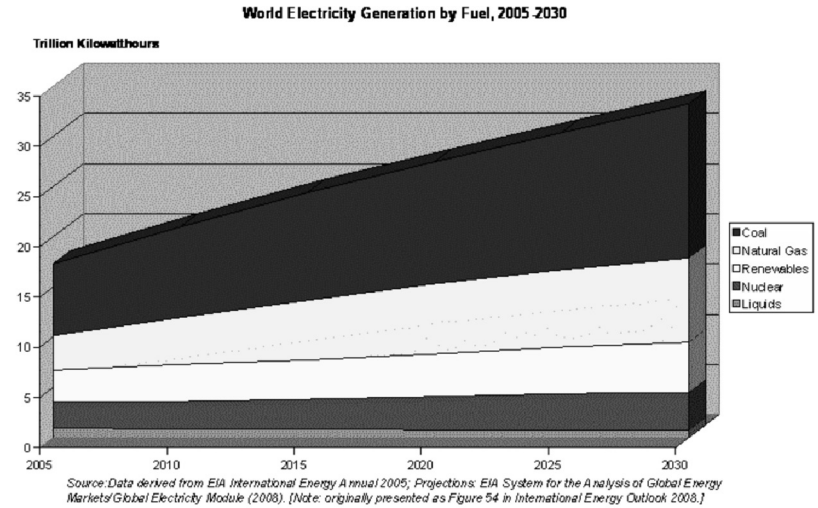


**Figure 2**

solar power) will grow rapidly, but they will remain a relatively small contributor and will not replace significant quantities of fossil fuels in the near future. As shown in Figure 2, the DOE/EIA projections show that coal will continue to maintain its leading role in producing the world's electricity.

## DIVERSIFYING ENERGY SOURCES

The new energy plan lists several ways of diversifying energy sources, including requiring that 10 percent of electricity come from renewable sources by 2012, promoting safe and secure nuclear energy, and developing and deploying clean coal technology.

Clean coal facilities hold enormous potential to reduce GHG emissions while providing energy diversity. The Obama-Biden administration supports incentives to accelerate investment in zero-carbon coal facilities, and the policy includes developing coal-fired plants with carbon capture and storage (CCS), considered key to using our abundant coal supply while mitigating and reducing the effects of global warming. CCS refers to capturing $CO_2$ (one of Earth's most abundant GHGs) from coal-fired power plants and storing it underground, in deep-saline aquifers or other geologic formations.

**Circulating Fluidized Bed Technology—**
**Existing Solution Improves Coal's Environmental Performance**

In recent years, numerous improvements have been made to improve the environmental performance of coal-fired power plants. One unique and innovative steam generator technology, circulating fluidized bed (CFB) technology, offers a highly efficient way of burning coal alone or in combination with biomass, capturing pollutants, and transferring the fuel's heat energy into high-quality steam used to produce power.

Unlike conventional steam generators that burn the coal in a massive high temperature flame, CFB technology doesn't have burners or a flame within its furnace. It uses fluidization technology to mix and circulate the fuel particles with limestone as they burn in a low-temperature combustion process. The combination of limestone and low burning temperature removes pollutants or minimizes their formation during the burning process. A further environmental enhancement is highly efficient vertical-tube, supercritical steam technology, which allows more of the fuel's energy to be transferred to the steam. This improves overall power plant efficiency, reducing the amount of fuel needed for electricity production and further reducing air emissions by an estimated 30%.

Due to their unique combustion process, CFBs can be used to burn biomass fuels such as forest residue, demolition wood, saw dust, corn husks, and sugar cane. Biomass is considered carbon neutral, since it absorbs and stores carbon from the atmosphere during its growth cycle through photosynthesis. When burned, biomass releases the same carbon back to the atmosphere, resulting in nearly zero net $CO_2$ emissions to the atmosphere.

So, if burning biomass reduces $CO_2$ emissions, why don't we build power plants that burn *only* biomass? The answer is that the undeveloped biomass supply chain limits the size of biomass power plants to about 25-50 megawatts electrical (MWe). We would need ten or more biomass plants to replace each existing large scale (300 MWe or larger) power plant. The small scale and fuel supply limitation means that electricity from a biomass plant costs about 20 to 30 percent more than that from conventional large fossil power plants.

Again, the CFB offers a solution. Due to its fuel flexibility, a large scale CFB power plant can be built to burn a combination of coal and several types of biomass, capturing the environmental benefit of substantially reducing $CO_2$ emissions and the economic benefit of providing

affordable electricity. Its flexibility meets consumer demand by using more biomass when available, or falling back on coal when it is not. The good news is that this can be done *today*, while still producing affordable electricity.

## LONG-TERM ENHANCEMENT COULD VIRTUALLY ELIMINATE GHG EMISSIONS

While a 30 percent reduction in $CO_2$ emissions is a big step in the right direction, projections show that we need to do much more to reduce the effects of global warming, and CCS is the direction towards which policy makers and the industry seem to be moving. New flexible combustion technologies like Flexi-Burn$^{TM}$, under development by Foster Wheeler, hold promise for dramatically lowering both the cost and technology risk for the CCS solution.

These technologies simplify the $CO_2$ capture and removal process by using a mixture of oxygen and recycled CFB flue gas to produce a $CO_2$-rich flue gas that can be more easily captured. The technology could reduce coal plant $CO_2$ emissions to the atmosphere by more than 90 percent, offering practically carbon-free electricity at a low cost, compared to other available technologies. As shown in Figure 3, a supercritical 600 MWe CFB plant burning 20 percent biomass is estimated to produce 32 percent less $CO_2$ emissions than a conventional coal plant.

## MEETING CRITICAL CHALLENGES AHEAD

Our nation faces critical challenges in meeting the demand for affordable power in an era of economic uncertainty, when stimulating growth is at the top of the priority list. How can we move forward with this need to keep energy prices affordable while at the same time making progress on the ambitious environmental agenda that includes diversifying our energy sources, improving the environment, and reducing the effects of climate change? We will need to use all the tools in our arsenal, including relying on existing technologies that can provide environmentally friendly power at a cost we can handle. As the Obama-Biden energy plan has outlined, no one solution will fit the bill, but with

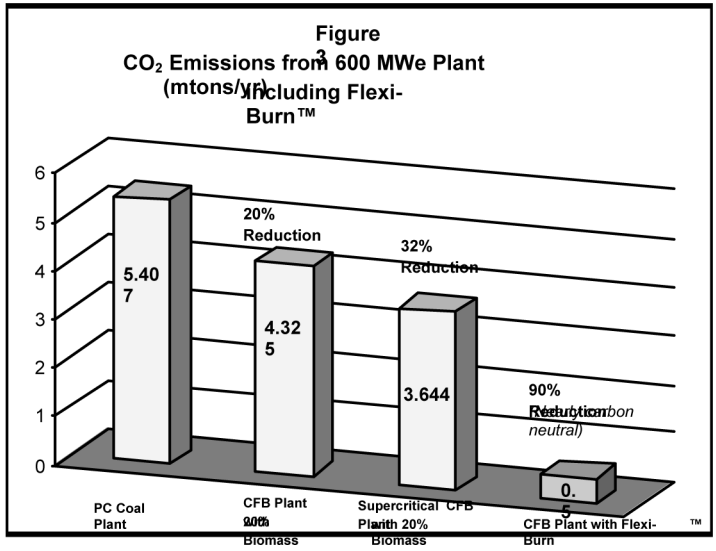


**Figure 3**

the integration of CFBs into existing and new coal-burning plants, we are taking a step towards a brighter future.

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**Robert S. Giglio** is the director of Global Marketing and Strategy for the Foster Wheeler Global Power Group. In this role, Giglio supports the Global Sales and Marketing Group (GSM) within the Global Power Group (GPG) with all marketing efforts. Giglio is a power industry expert with a gift for explaining complex industry technology in easily understood terms for nearly every audience. An MSME graduate of the Massachusetts Institute of Technology in Cambridge, MA, Giglio has been with the company since 1994.