REBUILDING AFTER KATRINA: SMART ENERGY CHOICES

EXECUTIVE SUMMARY

Energy efficiency has been part of the American lexicon since 1978 when the Energy Policy Act[1] was first enacted. Since then, energy efficient homes and increased use of renewable energy resources have become the norm in states like New York and California. Policies and programs have supported these statewide efforts while $847 million in federal funding has recently been allocated to help homeowners across America build better homes[2]. Still, some parts of the country continued to use outmoded housing codes and practices even when it was no longer considered sustainable. The Gulf Coast region of Louisiana, Mississippi, and Alabama was such a place. There is no way to know how many of the homes in the Gulf Coast region were inefficient prior to the hurricane. However, the gap between best practice and actual practice was revealed as Hurricane Katrina came ashore along the Gulf Coast and many Americans glimpsed the sub-standard housing that been the ***status quo*** in the region for years.

Yet in this disaster, there is an opportunity synchronous with recent changes in building policies. For example, in September 2005, the new Energy Policy Act[3] was passed by Congress into law. The International Code Council (the ICC, an agency setting the standards for U.S. buildings) likewise upgraded its IECC 2006 codes for new homes[4]. And the government-sponsored ENERGY STAR program of the United States Environmental Protection Agency (EPA) amended its guidelines for new homes in October 2005[5]. Luckily, the policies for a ***"right rebuild"*** are in place. Now, a sound financial justification for making "smart energy choices" is needed since 310,353[6] new single family homes must be built in the affected regions immediately.

By using a complex suite of DOE-2 modeling analyses[7] along with climate, census, and emergency management data from Louisiana, Mississippi, and Alabama, this paper makes the case for an energy efficient rebuild. This modeling compared the impacts of rebuilding homes that may have been built to minimum building codes (as a baseline for comparison) versus four increasingly more energy-efficient standards[8]. While the "quick payback" scenario illustrated the fastest payback considering the initial investment, the 2006 ENERGY STAR New Homes Guidelines showed the most reasonable short-term payback with larger savings over time. For example, the initial investment of $900 million to rebuild 310,353 homes to the ENERGY STAR guidelines would have a payback of just 7.5 years—much less than the term of the mortgage.

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[1] National Energy Act, November 8, 1978, included provisions for conservation incentives and taxes, among other provisions.
[2] FY 2006 Budget Request for the Department of Energy energy efficiency programs is $847 million. Source: "Federal Energy Efficiency Program Funding" Alliance to Save Energy, Washington, DC. 2005.
[3]The Energy Policy Act of 2005 (Public Law 109-58) is a statute which was passed by the United States Congress on July 29, 2005, and signed into law on August 8, 2005.
[4] Details of the IECC 2006 may be found at http://www.iccsafe.org
[5] Details of the new ENERGY STAR New Homes Guidelines may be found at http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/Perf_Path_Final_100605.pdf
[6] The total homes destroyed are counted (for this report) as single family units only, numbering 310,353 total. In Louisiana 241,524 homes were destroyed; 68,466 homes were destroyed in Mississippi; and 363 homes were lost in Alabama. Source: Federal Energy Management Agency (FEMA)
[7] Department of Energy created a software package known as DOE-2 modeling.
[8] The three more stringent standards were the IECC 2006, the EPA ENERGY STAR new homes guidelines, and "best practices" as outlined by the modeling team. Details of these scenarios may be found in Table 1.

Due to the increased quality of the home and short return-on-investment, the ENERGY STAR scenario is recommended as the minimum threshold for single family homes during the rebuild. Additionally, the annual electricity savings (using this scenario) would avoid the equivalent of one South Carolina nuclear plant[9], and reduce greenhouse gas emissions equivalent to taking 51,221 cars off the roads.

BACKGROUND

The Hurricane Hits

On August 29, 2005, at 6:10 a.m., a Category 4 hurricane made landfall near Buras, Louisiana, with 145 mph winds. By 9:00 a.m., New Orleans' Lower Ninth District was under 8 feet of water and a path of destruction the size of the United Kingdom[10] had been created and leaving 1.5 million people without power[11]. The number of parishes affected in Louisiana was 31, in Mississippi 47 counties were affected, and in Alabama 8 counties saw damage[12] to their single family housing units of 2.1 million[13]. Of the total population of 6 million[14] people in the affected areas, an estimated 1.5 million[15] were evacuated from Louisiana alone and hundreds of thousands had set out on the largest transmigration across America since the Dust Bowl of the 1930s. By October 2005, an estimated 2.2 million people had registered for aid from the Federal Energy Management Agency[16] (FEMA) and 416,852 people were still without power in Texas and Louisiana[17].

In four short hours, a city fondly called "the Big Easy" by Americans became a site of vast difficulty as events compounded the tragedy. In weeks, the consequences of Katrina created a death toll of nearly 1,281[18]. Many who perished were among America's most economically-challenged (the average per capita income of those affected by the hurricane was around $17,000[19]). The scope and scale of the healing process and the rebuild is monumental. An estimated 160,000[20] new single-family homes will need to be built in the coming months in New Orleans alone, with a grand total of 310,353[21] single family homes needing to be built in the three states.

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[9] The H. B. Robinson nuclear plant near Hartsville, S.C. produces 710 MW peak power. Source: http://www.progress-energy.com

[10] 90,000 square miles of land were affected. Source: "USA: Hurricanes Katrina and Rita Information on Bulletin No. 12." American Red Cross, 5 Oct. 2005. Source: http://www.reliefweb.int/rw/RWB.NSF/db900SID/RMOI-6GW9FP?OpenDocument

[11] Source: "Katrina Timeline" CNN.com; Source: http://www.cnn.com/SPECIAL/2005/katrina/interactive/timeline.katrina/large/frameset/exclude.html

[12] Source: FEMA. Source: http://www.fema.gov/media/index.shtm#rita

[13] The total number of housing units in the affected counties and parishes numbered 2,591,103 by the reckoning of the Population Division of the U.S. Census Bureau. However, the U.S. Census of 2000 counted 2,116,155 single family houses (not including mobile homes) in the affected parishes and countries. (The latter number is used for purposes of this report).

[14] Housing Estimates for Counties: April 1, 2000 to July 1, 2004 (HU-EST2004-MS)

[15] Source: Wikipedia "Timeline of Hurricane Katrina". Source: http://em.wikipedia.org/wiki/Timeline_of_Hurricane_Katrina#Parallel_political_timeline

[16] Source: FEMA. Source: http://www.fema.gov/media/index.shtm#rita

[17] Source: Office of Electricity Delivery and Energy Reliability, US Department of Energy, "Gulf Coast Hurricane's Situation Report #9". October 4, 2005. (3:00 pm EDT)

[18] As of October 21, 2005. Source: http://www.mercurynews.com/mld/mercurynews/news/breaking_news/12943028.htm

[19] The average income was based on figures from the U.S. Census of 2000. The average income for a family of 4 in the U.S. in 2004 was $18,850. Source: "2004 HHS Poverty Guidelines". Federal Register, Vol. 69, No. 30, Feb. 13, 2004. pp 7336-7338.

[20] Army Corps of Engineers official estimate of 160,000 homes in New Orleans that are beyond repair as of Sept. 13, 2005. Source: "Katrina Timeline" CNN.com; Source: http://www.cnn.com/SPECIAL/2005/katrina/interactive/timeline.katrina/large/frameset/exclude.html

[21] The total homes destroyed are counted (for this report) as single family units only, numbering 310,353 total. In Louisiana 241,524 homes were destroyed; 68,466 homes were destroyed in Mississippi; and 363 homes were lost in Alabama. Source: FEMA

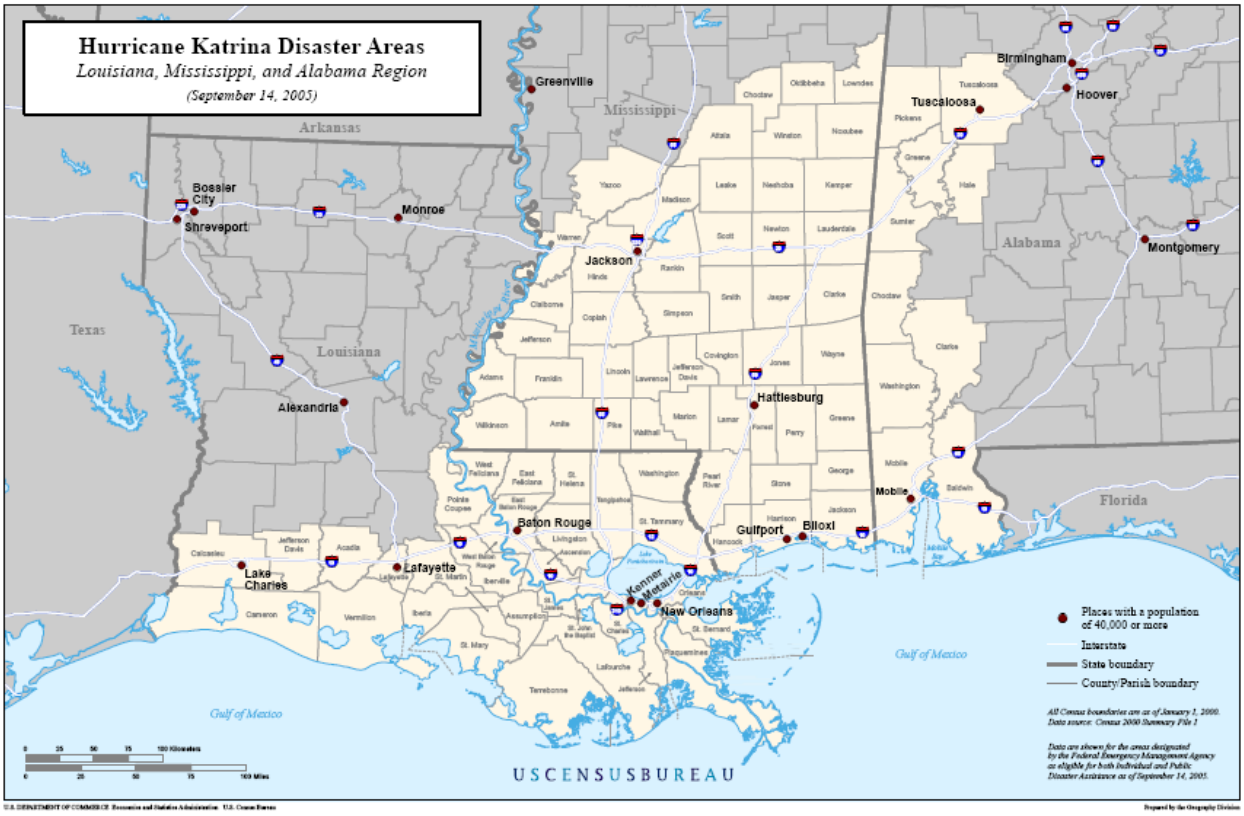


Figure 1 Map of Affected Area (dots illustrate locations with population density of 40,000 or more)

OVERVIEW OF SINGLE FAMILY HOUSING IN THE GULF COAST AREA

Brief History of the Gulf Coast Areas' Single Family Housing

After the Civil War, men known as "carpet baggers" came into the Gulf Coast region, taking advantage of a ravaged countryside and its people. In the 140 years since the Civil War, the Gulf Coast region was populated and an estimated 2 million single family homes built in the affected region. By 2000, the average cost of those homes was $71,685, nearly $48,000 less than the average single-family home in America[22]. These homes were not only cheaper than the typical U.S. house, they were also older, with an average build-date of 1975.

The people in the Gulf Coast areas affected by Hurricane Katrina were more vulnerable than the average populace in America. The percent of the population living on incomes at or below the poverty line in the parishes and counties affected by the hurricane was 19%[23] of the population. The average age of those homes was not only three decades but the relative energy efficiency (as compared the national average) was lower than the norm. The Gulf Coast region hit by Hurricane Katrina had a history of lagging behind the rest of the country in terms of infrastructure, housing quality, and economic robustness. In short, the region was ripe for the kind of disaster the hurricane wrought.

[22] According to U.S. Census 2000 data, the average single-family house in America cost $119,600. Source: Census 2000. Source: http://www.census.gov/prod/2003pubs/c2kbr-20.pdf
[23] Gulf Coast: Poverty Status, 2000-2002.

After Hurricane Katrina, a new breed of "carpet baggers" set upon the Gulf Coast region, once again attempting to take advantage of a ravaged countryside and weary populace. But unlike the post-Civil War years, today's opportunists are local. Suppliers from drywall to roofing materials are inflating material costs and large-scale builders are vying to hire every able-bodied worker capable of swinging a hammer. Yet some large retailers are taking an active stewardship role in the reconstruction. For example, The Home Depot and its suppliers have partnered to donate nearly $1.2 million of products to those areas in need, along with $4 million in donations from the Home Depot Foundation[24]. Meanwhile, Congress is seeking to pass bills to shield contractors from litigation that might result from workers in this polluted, dangerous area that is today's Gulf Coast. The time to anticipate the impacts of smarter choices for the rebuild is now.

METHODOLOGY

Datasets and Modeling Software

Housing characteristics, including construction type, architectural characteristics, and quantity of construction from the 86 counties and parishes in the three hardest-hit states (Louisiana, Mississippi, and Alabama) were gleaned from 2000 Census Bureau data. Modelers established a baseline of what existed pre-Katrina using DOE-2[25] modeling software to compare the economic and environmental benefits of rebuilding in an energy efficient manner. For the ease of modeling a representative sample, only single-family homes units were considered since 67% of the homes destroyed were this housing type. Means Cost Data[26] aided in modeling the "per unit cost to rebuild" each home for each scenario. NAHB[27] data described the housing starts projections for 2005-2010 while additional economic characteristics for the region were gathered from the 2000 U.S. Census.

Codes and Standards

The codes climate in these three states gave a snapshot of what would be practical to expect during the rebuild. As of August 29, 2005, the local codes for energy efficiency in the three states were based on standards as recent as the year 2000 and as old as 1975[28]. However, recent code revisions have made an energy efficient rebuild possible. For example, the newly-revised IECC 2006[29] of the International Codes Council was considered in one scenario. And since the government-sponsored ENERGY STAR program of the EPA amended its New Homes Guidelines in October 2005[30], and those guidelines are effective beginning January 1, 2006, those guidelines were considered as another scenario.

[24] Source: http://www.ir.homedepot.com/ReleaseDetail.cfm?ReleaseID=174000
[25] Department of Energy created a software package known as DOE-2 modeling.
[26] Means Cost Data was gathered from the RS Means Construction Cost Estimating Guide, 2005. RS Means, Kingston, Ma, USA.
[27] National Association of Homebuilders
[28] Louisiana Residential Code is the IBC 2000 as the uniform Construction Code, following the IECC 2000; and is mandatory. Mississippi Residential Energy Code is PRIOR 92MEC, and based on ASHRAE 90-1975; and is voluntary. Alabama Residential Energy Code is RECA 2000, a code equivalent to the 2000 IECC, a voluntary standard. Sources: US DOE Energy Efficiency and Renewable Energy Home Page http://www.ase.org/uploaded_files/policy/states/Louisiana.doc;http://www.ase.org/uploaded_files/policy/states/Mississippi.doc; http://www.ase.org/uploaded_files/policy/states/Alabama.doc
[29] Details of the IECC 2006 may be found at http://www.iccsafe.org
[30] Details of the new ENERGY STAR New Homes Guidelines may be found at http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/Perf_Path_Final_100605.pdf

Options for the Gulf Coast Rebuild

Four scenarios were selected for modeling, against a baseline set at the Model Energy Code 1993 (MEC 93). In this baseline, it was assumed that all houses destroyed had indeed been constructed to a code standard that was approximately a decade old. Yet, as can be seen from a cursory review of the codes for these states, it is probable that many of these houses were not built to such a recent code. Nonetheless, the baseline was established as if the home had a window solar heat gain coefficient (SHGC) of 0.58, a wall R-value of 13, an attic R-value of 23, an air conditioner Seasonal Energy Efficiency Rating (SEER) of 10, and an estimated size of 2,000 s.f. The four increasingly more stringent scenarios are shown in Table 1.

Table 1 Comparison of the Baseline and Four Scenarios

	Baseline **MEC 93**	Scenario 1 **Quick Payback**	Scenario 2 **IECC 2006**	Scenario 3 **ENERGY STAR 2006**	Scenario 4 **Best Practices**
Window SHGC	0.58	0.58	0.40	0.40	0.30
Appliances and Lighting	Standard	ENERGYSTAR labeled	Standard	ENERGYSTAR Labeled	ENERGYSTAR Labeled
Duct Leakage	~13%	~6%	~13%	~6%	~6%
Wall R-Value	13	13	13	13	19+
Attic R-Value	23	~23	30	30	44
AC SEER	10	Upgrade from 13 to 14	13	14	17
Square Footage	2,000 s.f.	2,000 s.f.	2,000 s.f.	2,000 s.f.	2,000 s.f.

Using datasets of several thousand factors and applying those factors to the four basic upgrades in energy efficiency as seen in Table 1, researchers modeled 72,000 DOE-2 runs to characterize the impacts in two climate zones, and eight cities in the Gulf Coast region affected. This modeling provided the baseline for a ***"plain vanilla"*** single-family housing unit in the three states on August 29th, 2005, for comparison with four energy efficiency upgrades.

"Builders are operating at a very healthy pace and see little let up in the months ahead, despite the initial shock and economic uncertainties immediately following hurricanes Katrina and Rita."

Dave Wilson, President of the National Association of Home Builders (NAHB)

RESULTS

The estimated number of homes requiring demolition and rebuild has been estimated to be as many as 2.1 million single family homes. As mentioned, this study modeled only those homes utterly obliterated. It bears mentioning that the cost estimates for constructing new homes with these upgrades must be considered estimates only. The cost of materials, regional labor cost differences, the value of money, the cost of electricity or gas, and many other factors might affect these building costs and therefore, the simple payback period estimates.

With that disclaimer in mind, in terms of the "cost to upgrade", Scenario 4 proved to be the most expensive initial investment, at $6,003 per home. This initial cost put the simple payback period at about 12.5 years. Yet when this payback period is considered within the context of a 30-year mortgage, that return-on-investment appears more favorable. The next most costly upgrade was Scenario 3 (ENERGY STAR) at a cost $2,754 per home. Yet the ENERGY STAR scenario had a ***much quicker*** payback than Scenario 4 (Best Practices) or the less expensive option, Scenario 2 (IECC 2006). The simple payback period for Scenario 3 (ENERGY STAR) was just 7.5 years.

The lesser expensive option was Scenario 2, IECC 2006. This option cost an estimated $1,511 to upgrade the home, yet paid back the initial investment in 8.5 years. The most rapid return-on-investment was found to be the Quick Payback scheme outlined in Scenario 1. The initial investment of $527 paid for itself in just over 2 years. However, due to the lack of envelope and insulation considerations, the "quick payback" scenario is **not** recommended for the rebuild. The initial investment per home may be seen in Figure 2 while the annual utility bills savings per home are seen in Figure 3.

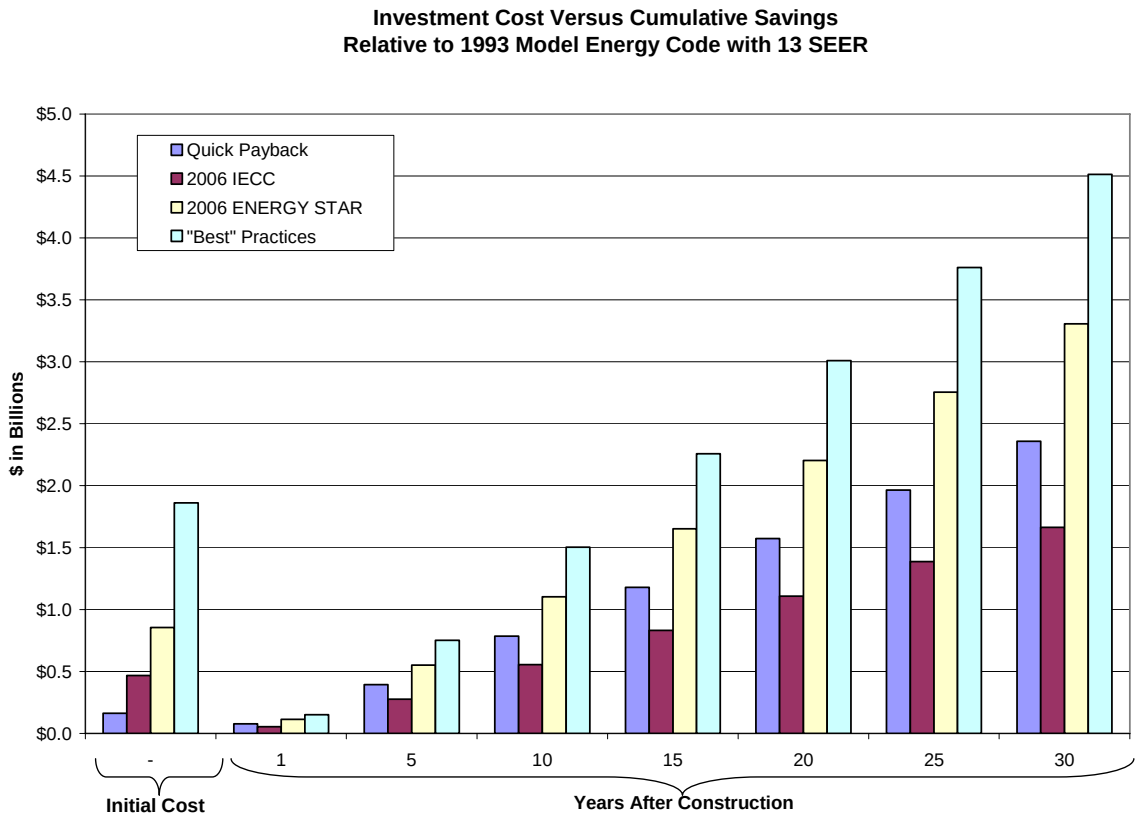
		Per Unit			
		($)			
Total Units		Scenario			
		1	2	3	4
	Year	Quick Payback	2006 IECC	2006 ENERGY STAR	"Best" Practices
Incremental Upgrade Cost	-	**$527**	**$1,511**	**$2,754**	**$6,003**

Figure 2 Incremental Cost to Upgrade (Per Home)

		Per Unit			
		($)			
Total Units		**Scenario**			
		1	**2**	**3**	**4**
	Year	**Quick Payback**	**2006 IECC**	**2006 ENERGY STAR**	**"Best" Practices**
Incremental Annual Utility Bill Savings	**1**	$254	$179	$365	$485
	2	$507	$358	$711	$971
	3	$761	$537	$1,066	$1,456
	4	$1,014	$715	$1,422	$1,941
	5	$1,268	$894	$1,777	$2,427
	6	$1,522	$1,073	$2,133	$2,912
	7	$1,775	$1,252	$2,488	$3,397
	8	$2,029	$1,431	$2,844	$3,883
	9	$2,283	$1,610	$3,199	$4,368
	10	$2,536	$1,788	$3,555	$4,853
	11	$2,790	$1,967	$3,910	$5,338
	12	$3,043	$2,146	$4,266	$5,824
	13	$3,297	$2,325	$4,621	$6,309
	14	$3,551	$2,504	$4,977	$6,794
	15	$3,804	$2,683	$5,332	$7,280
	16	$4,058	$2,861	$5,688	$7,765
	17	$4,312	$3,040	$6,043	$8,250
	18	$4,565	$3,219	$6,399	$8,736
	19	$4,819	$3,398	$6,754	$9,221
	20	$5,072	$3,577	$7,110	$9,706
	21	$5,326	$3,756	$7,465	$10,192
	22	$5,580	$3,935	$7,821	$10,677
	23	$5,833	$4,113	$8,176	$11,162
	24	$6,087	$4,292	$8,532	$11,648
	25	$6,340	$4,471	$8,887	$12,133
	26	$6,594	$4,650	$9,243	$12,618
	27	$6,848	$4,829	$9,598	$13,104
	28	$7,101	$5,008	$9,954	$13,589
	29	$7,355	$5,186	$10,309	$14,074
	30	$7,609	$5,365	$10,665	$14,559

Figure 3 Incremental Annual Utility Bill Savings (Per Home)

Figure 4 Total Investment Versus Total Savings for All Scenarios Against Baseline



"The typical Mississippi family spends $1,300 annually on their homes' utility bills. Home energy costs are often the second-highest expense, after the mortgage payment."

Mississippi Development Authority

Recommendations

For the Gulf Coast rebuild, the opportunity to build energy efficient single family homes is clear: a ***"right rebuild"*** will have long-term benefits to the homeowners, the local utilities, the region, and the nation. For homeowners, building homes that have tight envelopes, good insulation, proper windows, and energy efficient equipment will reduce their monthly energy bills and increase the comfort and health of the occupants. The benefit of reduced energy bills cannot be understated. In present-day Mississippi, 34% of the household income pays the mortgage. The second-highest cost is energy bills.

As consumer energy bills rise, some regions are more challenged than others. For example, a study in North Carolina[31] found that of every 100 trailers sold, 20 were repossessed. The problem was not mortgage costs that were too high, rather, the problem was that the monthly energy costs were more than the mortgage. With utility bills as high as $230 a month, the 30-year mortgage on a $25,000 mobile home was minor in comparison.

The fragility of the household incomes in the Gulf Coast region certainly plays a part in determining what ***ought to*** be re-built there. The average annual energy bills for the region were around $1,200. Scenario 3 (ENERGY STAR) returns a higher amount than the "Quick Payback" scenario, for example. **For that, and other reasons, ENERGY STAR 2006 is the recommended threshold for the rebuild.** In other words, there should be no single family home re-built with government-assisted funding that does not conform to the ENERGY STAR for New Homes Guidelines, as a minimum.

Figure 5 illustrates the overall cost and accumulated savings to be gained by rebuilding to the 2006 ENERGY STAR for New Homes Guidelines.

Year	RECOMMENDED REBUILD THRESHOLD Scenario 3 2006 ENERGY STAR for New Homes Guidelines
-	***$900,000,000 (initial cost to build 310,353 single family homes)***
1	$100,000,000 savings
5	$600,000,000 savings
10	$1,100,000,000 savings
15	$1,700,000,000 savings
20	$2,200,000,000 savings
25	$2,800,000,000 savings
30	$3,300,000,000 savings

Figure 5 Estimated Costs and Savings for Rebuild to ENERGY STAR Standards

[31] Scommegna, P. ***"Study Finds US Manufactured-Homeowners Face Quasi-Homelessness".*** Population Reference Bureau. Source: http://www.prb.org/Template.cfm?Section=PRB&template=/ContentManagement/ContentDisplay.cfm&ContentID=11719

OTHER BENEFITS OF SMART ENERGY CHOICES

Load Reduction

The simple payback period for each rebuild scenario was calculated (based on incremental annual utility bill savings) without considering rising costs of electricity (which increased 3.3% in this region in the past year) or rises in crude oil prices (which rose 64% in the past year). In the recommended scenario (ENERGY STAR), an estimated 713 MW annually would be avoided, roughly equal to one nuclear power plant serving Hartsville, South Carolina[32]. The increased benefits in savings for local power plants, and the environmental benefits (in an already-challenged region) would be reduced greenhouse gases in the form of CO_2 equivalent to removing 51,221 cars from the roads[33]. And for every 1 MW avoided, an estimated $1 million is saved, and similar savings are achievable in reduced distribution costs.

Better Health

As the rebuilding of the Gulf Coast continues, building energy efficient homes through the 2006 ENERGY STAR for New Homes Guidelines (along with the Indoor Air Package guidelines being piloted) ensure that occupants of these new homes will spend less on medical-related problems and mold-remediation costs long associated with poor construction techniques in hot, humid climates. When considering that indoor air pollution is responsible for one death every 20 seconds[34], and that the economic impacts of indoor pollution have been estimated at billions of dollars a year[35], spending a little more on each home to avoid these costs is money well-spent.

LEVERAGING LOCAL, STATE, AND FEDERAL PROGRAMS OR TAX INCENTIVES

Louisiana Homeowners

Homeowners in Louisiana can access the Louisiana Home Energy Rebate Option (HERO) program, the Home Energy Loan Program (HELP), the Property Tax Exemption, or the Qualified Allocation Plan (QAP) program for rebuilding assistance or tax incentives. In general, the HERO program only requires that homes be built 30% better than the 1995 MEC, an outdated standard; and its cash assistance amounts to an energy efficiency premium up to $2,000. The HELP program, a program of the Louisiana Department of Natural Resources, precludes a homeowner from participating in the HERO program and largely consists of home improvement loans to make energy-related improvements to existing homes.

The Department of Natural Resources (DNR) offers to finance half of the improvements at 2% interest, up to a maximum of $6,000 on the DNR portion. Property tax exemptions are available for owner-occupied home equipment that is energy efficient. The QAP program awards points to projects that include energy efficient products, including windows, doors, HVAC, and appliances.

The government should make these budgets available for leverage in the rebuilding efforts.

[32] The H. B. Robinson nuclear plant near Hartsville, S.C. produces 710 MW peak power. Source: http://www.progress-energy.com
[33] According to modeling by ICF.
[34] Source: "Reducing Indoor Air Pollution". California Air Resources Board. Source: http://www.arb.ca.gov/research/indoor/rediap.htm
[35] Source: World Health Organization "Indoor Air Pollution and Health" Fact Sheet. June 2005.

Mississippi Homeowners
Mississippi's homeowners can access the Energy Rated Homes of Mississippi Program or the Green Power Switch Generation Partners Program for rebuilding assistance. In the former, five levels of energy efficiency are given to homes, based on the Uniform Energy Rating System. The benefits to the homeowners are unclear. The Green Power Switch Generation Partners Program, a program under the Tennessee Valley Authority (TVA) and participating distributors. Under this program, homeowners are offered a dual-metering option. Homeowners may generate power, feeding excess back to the grid. TVA will purchase the entire output of a qualifying system and the homeowner receives credit for the power generated.

The government should make these budgets available for leverage in the rebuilding efforts.

Alabama Homeowners
Alabama homeowners may access the Income Tax Credit Program, the State Grant Program, or the Qualified Allocation Plan (QAP) program for rebuilding or tax credit incentives. In general, Alabama homeowners can receive an income tax credit for converting their main energy source for a home to renewable energy resources (for heating only). The State Grant Program is directed largely at biomass projects for industrial and commercial enterprises; and it is unclear if the government will consider rebuilding residential areas as a "government" program that would be eligible to use this program. Primarily, the program gives assistance in the form of loans with interest rates no higher than 2% above the prime rate (with maximum interest subsidy payment amount not to exceed $75,000). The QAP program awards points for projects that promote energy conservation by exceeding standards of the Council of the American Building Officials Model Energy Code (MEC).

The government should make these budgets available for leverage in the rebuilding efforts.

Federal Legislation that Aids Homeowners in All Three States
The most effective financing tool available to homeowners in all Gulf Coast regions affected by the hurricane may be found in the recent federal legislation of the U.S. government. On August 8, 2005[36], the Energy Policy Act of 2005 was enacted. This law includes various sections related to enhancing the energy use of citizens and industry. Among the Act's components are tax credits for energy efficiency. If homeowners along the Gulf Coast opt to build energy efficiently, they will receive incentives to do so. Were homeowners to build to 2006 ENERGYSTAR for New Homes Guidelines are recommended, homeowners could receive tax incentives. Unlike the state or local programs (cited above), the federal budget allocation is substantial: $50 million per year through FY2008.

[36] Inception dates of the Act were January 4, 2005, passed the H.R. 6 conference report by House and Senate, signed into law by the President August 8, 2005

For **builders of new homes**, the Energy Policy Act of 2005 (Section 1332) provides a credit up to $2,000 for a home that saves at least 50% compared to the 2004 IECC code[37], and $1,000 for an ENERGYSTAR manufactured home. The applicable dates for these incentives are calendar years 2006 and 2007.

For **owners of existing homes**, the Energy Policy Act of 2005 (Section 1333) includes a credit for homeowners for 10% of the cost of installing building envelope components consistent with the IECC code. There is no certification required. The credits are available for calendar years 2006 and 2007.

The home tax credit has an overall per household cap of $500 to reimburse homeowners for the following expenses:

- 10% of the cost for energy efficient insulation, doors, and/or ENERGYSTAR high reflectivity roofs
- 10% (up to $200) of the full cost of energy efficient windows
- Up to $300 of the full cost for purchasing a highly-efficient central air conditioner, furnace, heat pump, or water heater
- Up to $150 of the full cost of a highly-efficient furnace or boiler, and
- Up to $50 of the full cost of a furnace with a highly-efficient fan.

Favorable Mortgage Rates for Rebuilding in the Gulf Coast Region

As homeowners in the affected areas seek to rebuild, they will look for mortgage rates that will help them build homes they can afford to operate. In Louisiana, Mississippi, and Alabama "energy efficient mortgages" (or EEMs) are available through agencies like Fannie Mae. In Louisiana and Mississippi, these mortgages are available from EnergyWise Mortgage and Indigo Financial Group. In Alabama, these mortgages may be obtained from American Acceptance Mortgage, EnergyWise Mortgage, or the Indigo Financial Group. In general terms, EEMs allow homeowners to borrow funds to make energy improvements at the time of purchase of a home. The average annual savings to homeowners is $300 to $600. Fannie Mae should extend the EEMs to rebuilding homes damaged during the hurricane.

[37] For which the annual heating and cooling energy consumption is at least 50% below the 2004 International Energy Conservation Code (IECC).

RECOMMENDATIONS

1) The 2006 ENERGY STAR for New Homes Guidelines are the recommended threshold for all new single family homes construction undertaken during the rebuild.
2) State and local incentives should be leveraged for all new homes construction during the rebuild.
3) Federal tax credits and federal funding should be leveraged for all new homes construction during the rebuild to multiply the impacts.
4) EEMs programs (and other similar initiatives) should be extended to include new homes construction needed for the rebuild.
5) The financial benefits that accrue due to "smart energy choices" taken during the rebuild should be tracked to build a larger case for energy efficient development and subsequent mass deployment of energy efficient practices.

CONCLUSIONS

This research demonstrates that the decisions made in the coming months will impact the economics and resources of households, utilities, the region, and the nation for several decades to come. As power suppliers struggle to rebuild damaged infrastructure like power distribution systems, and every local provider of materials and manpower is stretched to its limits, there is no better time to reduce the eventual load on manpower and infrastructure than now. Homeowners will benefit from reduced energy bills while area builders will find a whole new business model in setting themselves apart from ***"plain vanilla"*** builders as they position themselves as ENERGY STAR builders.

Of course, rebuilding an area this large will not be easy. But as this study proves, rebuilding single family housing to an energy efficiency standard that is higher than what it was makes sound economic sense and forms the most coherent strategy for creating a sustainable re-construction. The incentives under the new tax credits bill, energy efficient mortgages, and state-centered incentives and financing--when supplemented with federal funds for the rebuild—only add to the financial benefits of making smart energy choices in the Gulf Coast rebuild. Even without these benefits, rebuilding the 310,353 homes to ENERGY STAR standards would be an investment that pays for itself quickly, and returns another $3.2 billion dollars into the local economy in just 30 years. Imagine what might be gained by making similarly intelligent energy choices for the other 2.1 million new homes needing to be built.

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ICF Consulting (www.icfconsulting.com) is a leading management, technology, and policy consulting firm. Drawing upon extensive industry knowledge, distinguished professionals, and innovative analytics, the firm develops solutions to complex defense, homeland security, social program, energy, environment, and transportation issues. ICF Consulting's approach to these issues is strengthened by its expertise in information technology, organizational improvement, research and evaluation, program management, and communications. Since 1969, ICF Consulting has been serving major corporations, government at all levels, and multinational institutions. More than 1,500 employees serve these clients in the Americas, Asia, and Europe.

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