IMPACTS OF 2008 HURRICANE SEASON ON LOUISIANA'S ENERGY INDUSTRY

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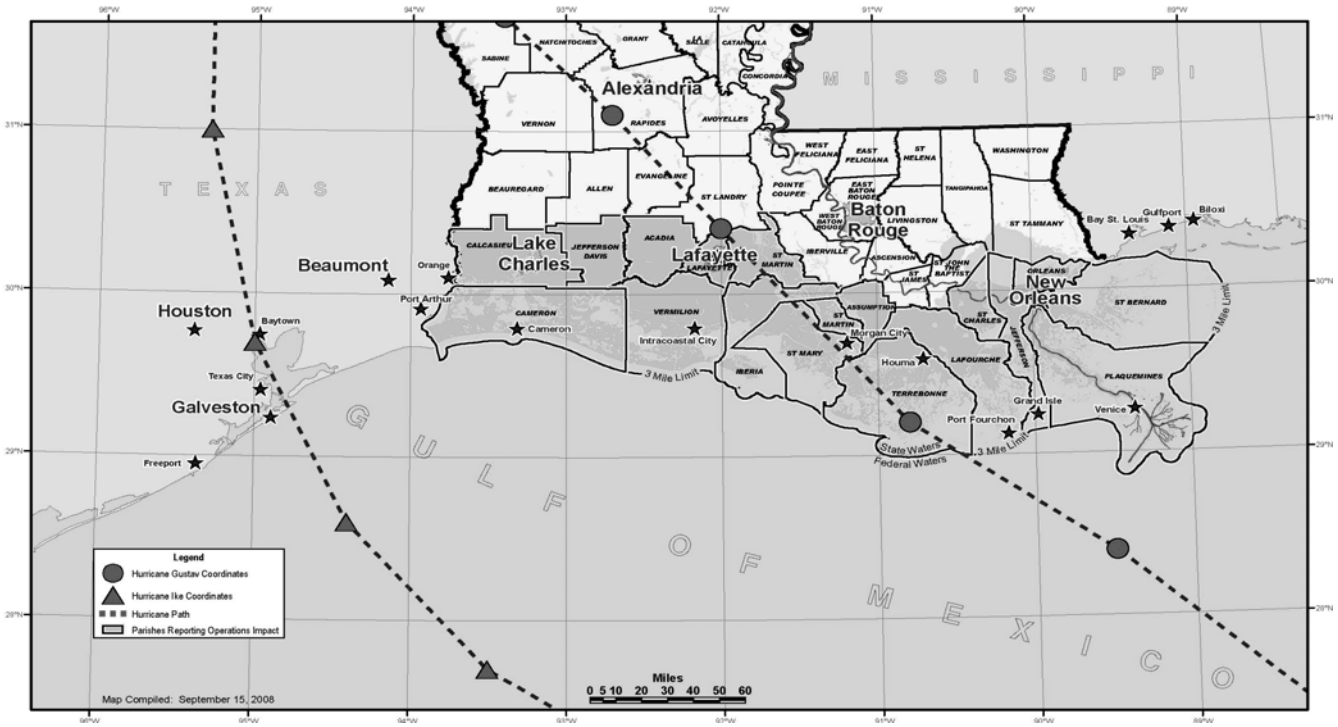
The 2008 Atlantic hurricane season was not as active as the 2005 season, the season that spawned Hurricanes Katrina and Rita. There were 16 named storms in 2008, compared to the record high 27 in 2005, and there were 8 hurricanes, a little more than half of the record high 14 hurricanes, also set in 2005. There was not a category five hurricane in 2008, but three reached category four status. The two most intense hurricanes in the Gulf during the 2008 season were Gustav and Ike, but fortunately they weakened to category three and high category two, respectively, before landfall. Gustav made landfall near Cocodrie, and marched northwest through the state causing major damage to the south central and eastern areas of the state. Ike passed parallel to the Louisiana coast, eventually turning north and making landfall near Baytown, TX, and caused major damage to the cities and coastal oil and gas production facilities in Southwest Louisiana and Southeast Texas. See Figure 1.

Before Hurricane Gustav, there were two others storms that threatened the Gulf of Mexico. Hurricane Dolly hit the southern Texas coast on July 23, and was the first hurricane of the 2008 season to make landfall in the U.S. Hurricane Dolly caused no deaths in Texas, though three were injured, and it caused an estimated $1.2 billion dollars in damage, but no significant damage to energy infrastructure in the Gulf of Mexico. On August 3, Tropical Storm Edouard formed in the Gulf of Mexico, becoming the second storm to threaten oil and gas operations in the area. Edouard skirted the Louisiana coast on its way to Texas, raising tides and pushing water up bayous and into yards. Residents of low-lying areas south of the Intracoastal Waterway in Cameron were ordered to evacuate on Monday, August 4, but were able to return on the following day. It forced many companies to shut down their operations in the Gulf of Mexico, and inbound shipping activities in the area were curtailed. Fortunately, the shutdowns were short-lived. Edouard did not cause any significant damage to oil and gas structures or the shipping industry.

Figure 1. Paths of Hurricanes Gustav and Ike.



Hurricane Gustav was the second major hurricane of the 2008 Atlantic hurricane season. Gustav caused $18 billion damage in Haiti, the Dominican Republic, Jamaica, the Cayman Islands, Cuba, and the United States. It formed on the morning of August 25, 2008 southeast of Port-au-Prince, Haiti, and rapidly strengthened into a hurricane early on August 26. On that same day it made landfall at Jacmel, Haiti. Later, it inundated the Dominican Republic, Jamaica, the Cayman Island and ravaged Western Cuba, and then steadily moved across the Gulf of Mexico. On September 1, the center of Gustav made landfall in Louisiana coast near Cocodrie as a strong Category Two hurricane and was downgraded to category one status four hours later, and then to a tropical depression the following day. Gustav continued moving northwest through Louisiana, before slowing down significantly as it moved through Arkansas on September 3. Gustav was not the strongest or costliest hurricane to ever strike Louisiana, but it was the one of the most destructive and disruptive to the citizens of Louisiana. Gustav affected all major cities in Louisiana with the exception of Lake Charles. The damage to oil and gas infrastructure is listed below in combination with the damage caused by Hurricane Ike due the short time period between the two storms.

Hurricane Ike was the third most destructive hurricane to ever make landfall in the United States. It was the third major hurricane of the 2008 Atlantic hurricane. Ike became a tropical storm west of the Cape Verde islands as hurricane Gustav was making landfall in Louisiana. By September 5, Ike was a category four hurricane, with maximum sustained winds of 145 mph and a pressure of 935 mbar. That made it the most intense storm in the 2008 Atlantic hurricane season. At one point, the diameter of Ike's tropical storm and hurricane force winds were 600 and 240 miles, respectively, making Ike the largest Atlantic hurricane ever recorded. Ike weakened to a category two hurricane before making landfall in Baytown, Texas on September 13, 2008. Hurricane Ike has been blamed for 82 deaths, and a few people are still missing. Damages from Hurricane Ike in U.S. coastal areas are estimated at $27 billion, the third costliest U.S. hurricane of all time, behind Hurricane Andrew in 1992 and Hurricane Katrina in 2005.

Oil and Gas Production and Transportation in the Gulf of Mexico

Offshore Gulf of Mexico

The Gulf of Mexico is a major center for crude oil and gas production; it produces about 25 percent of the crude oil and 15 percent of the natural gas produced in the U.S. As of August 2008, there were more than 3,800 production platforms in the Gulf of Mexico; these structures range in size from single well caissons in water depths of ten feet, to large complex facilities in water depths of over 7,000 feet. When tropical storms enter or are formed in the Gulf of Mexico, mandatory evacuations and shutdowns occur causing a disruption of oil and gas production. When damage from storms occurs, disruptions can be substantial.

The U.S. Department of the Interior's Minerals Management Service (MMS) Gulf of Mexico Regional Office reported Hurricanes Gustav and Ike damage to oil and gas operations in the Gulf of Mexico. It was estimated that approximately 1,450 oil and gas production platforms in the Gulf of Mexico were exposed to hurricane conditions from either Hurricane Gustav or Hurricane Ike.

As of November 26, 2008, sixty of the 3,800 offshore oil and gas production platforms have been confirmed as destroyed. The 60 destroyed production platforms produced a total of 13,657 barrels of oil per day or 1.05 percent of the oil produced daily in the Gulf of Mexico, and 96 million cubic feet of gas per day or 1.3 percent of the gas produced daily in the Gulf of Mexico. Currently, MMS has no information on whether any of the destroyed platforms will be rebuilt. Thirty-one platforms sustained extensive damage requiring three to six months to repair. Examples of damage that would be considered extensive could include underwater structural damage or major damage to pipelines carrying the oil or natural gas to shore. Ninety-three platforms sustained moderate damage requiring one to three months to repair. Damage that would be considered moderate may include major topside damage to critical process equipment such as the platform's compressor, or damaged risers

or flex joints where pipelines connect to the platforms. MMS has also confirmed a report of one jack-up drilling rig with extensive damage.

MMS reported on September 2, 2008, the day after Hurricane Gustav made landfall, that oil production was completely shut down and gas production was reduced by 7.06 billion cubic feet per day or 95.4 percent of daily Gulf of Mexico natural gas production. A total of 632 production platforms, or 88.2 percent of the Gulf's 717 manned platforms, were evacuated. Personnel from 110 drilling rigs, representing 90.9 percent of those operating in the region, were also evacuated.

When Hurricane Ike made landfall on September 13, MMS reported that nearly 7.3 billion cubic feet per day (nearly 100 percent) of the federal portion of the Gulf of Mexico's natural gas production was shut-in and oil production was completely shut down.

The latest report from MMS showed a total of 58 production platforms are still evacuated, equivalent to 8.4 percent of the 694 manned platforms in the Gulf of Mexico. There are no longer any evacuated drilling rigs in the Gulf. From the operator's reports, it is estimated that 16.3 percent of the oil production in the Gulf is still shut in, and 24.4 percent of the natural gas production in the Gulf is still shut in.

Onshore Louisiana

There is no report of major oil and gas structure damage resulting from Hurricanes Gustav or Ike onshore in Louisiana. The DNR Office of Conservation, in an attempt to assess the effects of Hurricane Gustav and Hurricane Ike on oil and gas production, contacted 126 operators with producing wells in a seventeen-parish region from the southern part of the state for information regarding the status of their production operations. The survey showed that 58 percent of the oil production and 50 percent of the gas production were shut in after Hurricanes Gustav and Ike passed. As of December 2, 2008, the survey indicated that 18 percent of the oil and 23 percent of the gas is still shut in. The surveys did not indicate the reason of the shut in.

The Louisiana Offshore Oil Port (LOOP)

LOOP stopped all operations on August 28 in order to give employees time to evacuate. The facility sustained no major damage and was out of commission for two weeks due to loss of power. Typically, about 1 million barrels per day goes through the LOOP.

Liquefied Natural Gas (LNG) Import Terminals

LNG facilities in the Gulf Coast region reported no major damage upon personnel returning to the facilities. Hurricanes Gustav and Ike had little impact on receipts of LNG shipments at the LNG terminal at Lake Charles, LA. The Sabine terminal and Gulf of Mexico offshore terminal were shut down due to evacuations, lack of supplies, an inability to move stored liquids, and safety precautions. Both facilities are once again operational.

Offshore Pipeline

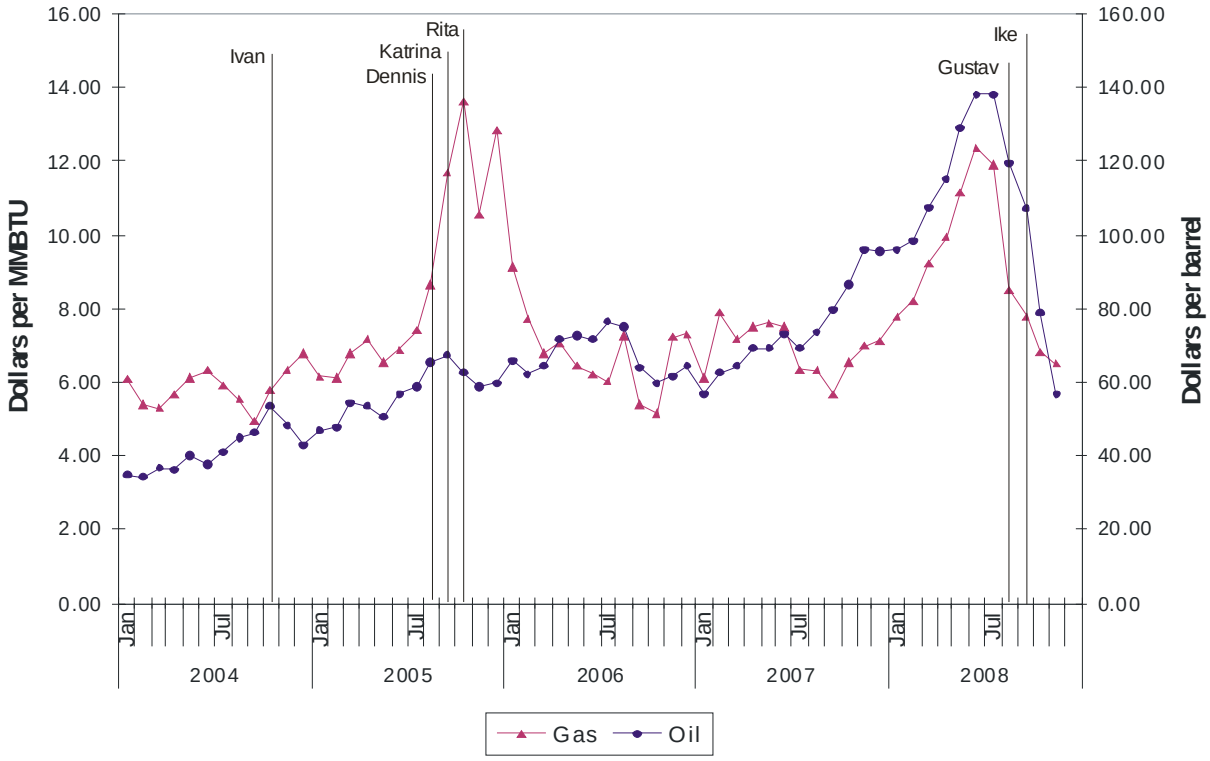
MMS has received reports of one oil pipeline system and eight gas transmission pipeline systems with damage. The analysis of the damages impact and time remaining until operations resume is continuing. Oil and gas operators and pipeline owners are testing and inspecting other pipeline systems to evaluate the full extent of any damage. Considering the large area that was impacted, it is expected to take a significant amount of time to complete the inspections. There have been no reports of oil spills in the Gulf of Mexico federal waters impacting the shoreline or affecting wildlife.

Louisiana Oil and Gas Prices

The dominance of oil and gas prices by the Gulf of Mexico stream is fading. Gas prices fell despite Hurricanes Gustav and Ike striking the region. See Figure 2 below. The Louisiana natural gas spot market price at Henry Hub was $8.20 per MMBTU on Friday before Hurricane Gustav hit and fell to $7.24 per MMBTU with 74.1 percent of the natural gas production in the Gulf was shut in. Two weeks later, Hurricane Ike crossed the Gulf before making landfall in Baytown, TX shutting down 98.5 percent of the gas production in the Gulf, but the gas price did not go higher than $8.20 per MMBTU. The gas production from the Gulf is over 7.0 billion cubic feet per day. Energy analysts are saying that Gulf production is not as important as it used to be due to an 11 percent (more than 6 billion cubic per day) increase in production from unconventional gas plays.

Oil prices had begun falling before, and continued to fall after, Hurricanes Gustav and Ike struck due to a decrease in demand brought on by the current financial crisis. Oil prices continued falling despite LOOP being out of commission for several weeks, Gulf oil production decreasing more than 40 percent for a month, and major refineries in south east Texas and south west Louisiana being shutdown (see the section on refineries for more information).

Figure 2. Louisiana Oil and Gas Spot Market Prices



Refineries

The only 2008 storm to impact Louisiana refineries was Hurricane Gustav which affected 14 of the 17 operating refineries in Louisiana. On September 1st, in anticipation of Gustav, 11 Louisiana refineries with a total capacity of 1.9 million bcd were shutdown. ExxonMobil in Baton Rouge, and Citgo in Lake Charles remained in operation, but with reduced runs. As Gustav moved through the area, ExxonMobil in Baton Rouge and Placid in Port Allen shutdown, bringing the total shutdown capacity to 2.5 million bcd, which is approximately 83 percent

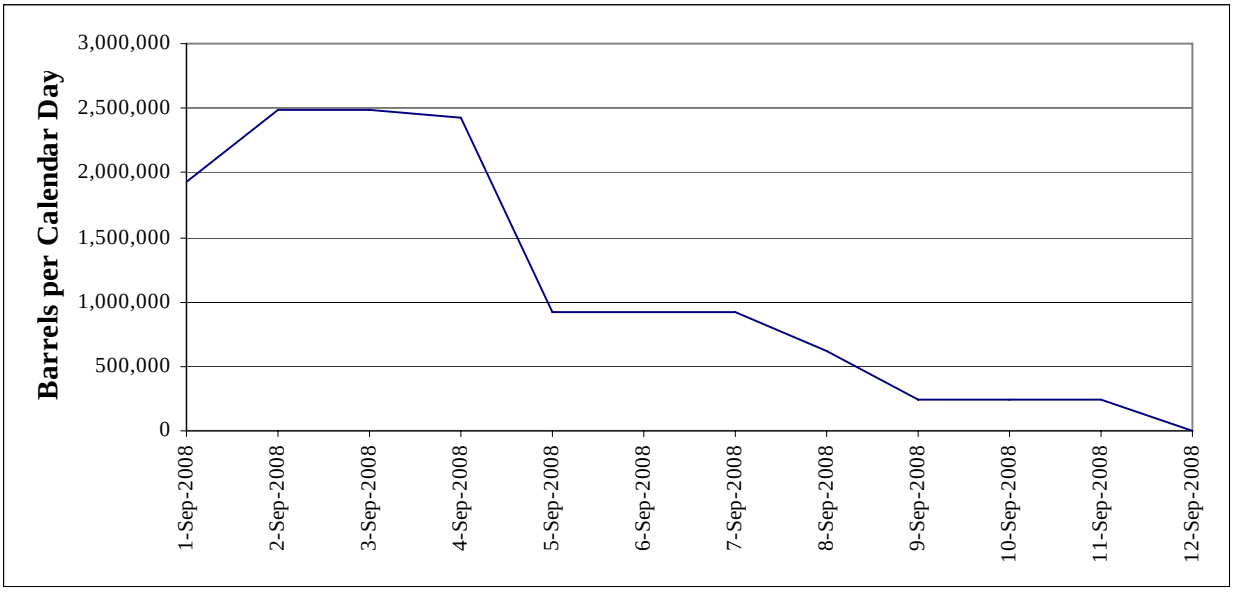
of the total Louisiana capacity. Citgo in Lake Charles continued reduced runs. Table 1 lists the Louisiana refineries that were affected by Gustav.

Table 1. Louisiana Refineries Affected by Hurricane Gustav

Refinery	Location	Capacity (bcd)
Calcasieu Refining	Lake Charles	78,000
Chalmette Refining	Chalmette	192,760
Citgo Petroleum	Lake Charles	429,500
ConocoPhillips	Belle Chasse	247,000
ConocoPhillips	Westlake	239,400
ExxonMobil	Baton Rouge	503,000
Marathon Petroleum	Garyville	256,000
Motiva Enterprises	Convent	235,000
Motiva Enterprises	Norco	236,400
Murphy Oil USA	Meraux	120,000
Placid Refining	Port Allen	56,000
Shell Chemical	Saint Rose	55,000
Valero Refining	Krotz Springs	80,000
Valero Refining	Norco	185,000

Gustav caused only minor damage to area refineries, so outages did not last long. By September 13th, most refineries were back to normal operation with a few operating with reduced runs or in start-up procedures. See Figure 3 for a timeline of shutdown refinery capacity.

Figure 3. Louisiana Refinery Capacity Shut Down Due To Hurricane Gustav



Electricity Generation and Transmission

On Labor Day Hurricane Gustav caused blackouts in Louisiana. The 2003 blackout in the northeast focused attention on the national importance of the transmission grid. The 2008 hurricanes focused similar attention on

the importance of the transmission grid in Louisiana. The hurricane damaged the major transmission lines running between Baton Rouge and New Orleans. While Baton Rouge received most of the damage, the power was off in New Orleans as well. About 829,000 customers were without power immediately after Hurricane Gustav passed through the state. Damage, as reported on the Entergy website, included 241 transmission lines and 354 substations out of service. These outages were second only to the outages during Hurricane Katrina in 2005.

Hurricane Katrina was an unprecedented event for electricity in Louisiana. Katrina was a large storm which impacted many utilities and caused major damage to property. Both the generating plants and the transmission infrastructure were affected. In addition, the flooding that accompanied the storm further worsened conditions by impeding access needed for recovery and restoration and damaging equipment that was sitting in the water. Difficulty in getting fuel, as well as the logistics of feeding and housing restoration crews in areas that were evacuated, compounded the problems.

Baton Rouge took the brunt of Gustav. Seven days after the hurricane struck Louisiana, about 40 percent of Baton Rouge was still affected by widespread power blackouts. The transmission system sustained a great deal of damage as the hurricane's path paralleled the major transmission lines between Baton Rouge and New Orleans, taking out the power lines. Most of the poles and the steel transmission towers carrying aboveground wire, were pushed to the ground. The resulting power outages hindered the state's storm recovery efforts. Storm debris and downed trees made access difficult for repair crews.

Hurricane Ike passed Louisiana before making landfall at Galveston, TX on September 13, 2008, causing additional power outages in Louisiana. The damage was not near the level of Rita in 2005.

Governor Bobby Jindal wants to reduce our vulnerability to natural disasters or intentional acts. He would like to add redundancies or harden these relatively few critical transmission lines to avoid future blackouts. Senator Mary Landrieu is working on legislation to give the federal government a role in strengthening the transmission lines in Louisiana. The Federal Power Act requires the Department of Energy to complete a study of electric transmission congestion every three years. The preparation of the 2009 Congestion Study is now underway.

The Louisiana Public Service Commission is conducting a post-storm review to determine what caused the outages and what can be done to minimize the effects of future storms. A review is part of the process of determining which storm related costs are recoverable from the ratepayers. Because the power outages were widespread and prolonged the review will include an inquiry into how the system maintenance dollars were spent. Recommendations will be forthcoming on how to reduce the possibility of future outages, as well as, recommendations to reduce their scope and duration.

The reliability of the electricity is important. As far as practical, safeguards should be put in place. Ultimately the customers will be shouldering the burden of paying for the upgrades. The costs and benefits will need to be balanced.

The Compelling Case for Natural Gas Vehicles (NGV)

A Comprehensive One-Day Workshop for Public and Private Fleet Operators and Clean-Air/Clean-Transportation Policymakers

9:00 a.m. – 4:30 p.m., Thursday, January 22, 2009, Shreveport Convention Center

Presenter/Moderator: Stephe Yborra, Director of Market Analysis, Education & Communications for the Clean Vehicle Education Foundation

Co-hosted by LA & TX Clean Cities Coalitions, The Southeast Louisiana Clean Fuel Partnership, The City of Shreveport, The City of Bossier City, and The Louisiana Department of Natural Resources Please visit http://www.cleanvehicle.org/workshop/Shreveport.shtml for agenda and registration.

CHANGES TO ENERGY CODES COULD AFFECT LOUISIANA

by

Billy Williamson, Engineer Intern

The International Codes Council began Final Action Hearings on proposed changes to the ICC codes September 17 in the Minneapolis Convention Center. Discussion of proposed changes to the energy efficiency requirements was scheduled for September 21. Lengthy discussions on several unrelated changes delayed the start until after 9:00 p.m. During the proceedings, a total of 37 energy code changes which might affect Louisiana were passed. These changes, along with brief summaries for each, are listed in the table on the following page. Separate proposals which made similar changes to the IECC and IRC are grouped together. Proposals beginning with "RE" affect the energy efficiency provisions of the IRC. Proposals beginning with "EC" either affect the IECC or both the IECC and the IRC energy conservation provisions. Of the proposals passed, a few made very significant changes affecting possible future codes in Louisiana.

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EC 22 part 2 and EC 26 make similar changes to the IRC and IECC. EC 22 part 2 updates the IRC, reducing the allowable solar heat gain coefficient (SHGC) in climate zones 1, 2, and 3 from 0.40 to 0.35. It also allows a SHGC of 0.40 to be used for impact-rated fenestration (windows and doors). EC 26 updates the IECC, reducing the allowable SHGC in the same climate zones from 0.40 to 0.30 and does not allow higher SHGC for impact-rated fenestration. These changes mark a significant difference between the two codes. Instead of the two codes being consistent, SHGC requirements of the IECC are more stringent than those of the IRC. This could lead to confusion in compliance and enforcement. EC 18, parts 1 and 2, reduce the allowable U-factors for fenestration to 0.65 and 0.50 for climate zones 2 and 3, respectively, and allows U-factors of 0.75 and 0.65 in those zones for impact-rated fenestration.

Several changes also affected the performance path of compliance. EC 91 removes the references to federal minimum appliance efficiencies from the performance path. Instead of comparing efficiencies to minimum levels, the IECC now references the IRC for proper sizing of mechanical equipment. Also dealing with the performance path, EC 92 reduces the amount of glazing area in the standard reference design from 18% to 15%, which was considered a more accurate estimate. EC 99 disallows the use of site energy and allows source energy for performance calculations. This eliminates problems associated with the use of mixed fuel sources in performance calculations.

The changes made to the IECC and IRC will be included in the 2009 versions of both codes. The Louisiana State Uniform Construction Code Council then has 2 years to review the updated codes. After this time, the state can either adopt the new codes or continue using the present statewide codes. If the new codes are adopted, they will represent significant increase in stringency of the statewide energy codes. They will also present new challenges to the officials tasked with enforcing the codes.

Energy Code Changes Affecting Louisiana

Proposal	Summary	CODE
RE 6	Moves equivalent U-factors and mass-wall R factors into tables	IRC
RE 8	Requires that all recessed luminaries be IC-rated	IRC
EC 84 pt 2	Requires that at least 50% of all luminaries must be high-efficacy; defines high-efficacy lamps	IRC
EC 15 pt 1	Requires that R-19 batts be labeled with full R-value and R-value if compressed into 5-1/2 inch cavity depth.	IECC
EC 15 pt 2		IRC
EC 18 pt 1	Reduces U-factor allowances to 0.65, 0.50, and 0.35 for zones 2, 3, and 4, respectively and allows impact rated fenestration u-factors of 0.75 and 0.65 in zones 2 and 3	IECC
EC 18 pt 2		IRC
EC 22 pt 2	Reduces SHGC from 0.40 to 0.35 in climate zones 1, 2, and 3. Allows SHGC of 0.40 for impact rated fenestration	IRC
EC 26	Reduces SHGC from 0.40 to 0.30 in climate zones 1, 2, and 3.	IECC
EC 36 pt 1	Adds basement wall insulation of R-5/13 for climate zone 3. Adds exception to the requirement for warm, humid climates	IECC
EC 36 pt 2		IRC
EC 37 pt 1	Limits the R-5 requirement for heated slab insulation to 2 ft or the depth of the footing, which ever is less.	IECC
EC 37 pt 2		IRC
EC 50 pt 1	Reduces requirement for continuous insulation to R-3 in climate zones 1 & 2 for steel-framed buildings.	IECC
EC 50 pt 2		IRC
EC 51 pt 1	Adds the option for 0 cavity insulation and R-10 continuous insulation in steel framed buildings where R-13 is required for wood frames.	IECC
EC 51 pt 2		IRC
EC 58 pt 1	Limits the opaque door exemption to one side-hinged, opaque door assembly up to 24 square feet.	IECC
EC 58 pt 2		IRC
EC 60 pt 1	Adds rim joist junctions to the list of sealing requirements	IECC
EC 60 pt 2		IRC
EC 64 pt 1	Adds air barrier and insulation inspection checklist and testing definition	IECC
EC 64 pt 2		IRC
EC 67	Requires a minimum R-6 duct insulation when using the performance path	IECC
EC 68 pt 1	Requires the installation of a programmable thermostat where primary heating is from a forced air furnace.	IECC
EC 68 pt 2		IRC
EC 71 pt 1	Requires that duct tightness be verified by testing at rough-in stage or during post-construction. Maximum leakage rates are specified.	IECC
EC 71 pt 2		IRC
EC 74 pt 1	Increases the minimum mechanical system piping insulation to R-3 from R-2.	IECC
EC 74 pt 2		IRC
EC 81 pt 2	Requires pool heaters to have readily accessible on-off switch and time switches. Also requires vapor-retarder pool covers for heated pools including solar heated	IRC
EC 82		IECC
EC 86	Modifies thermostat setpoints for performance calculations to 75/72 from 78/68	IECC
EC 91	Removes reference to federal minimum appliance efficiencies from the performance path. Makes the IECC reference the IRC for sizing.	IECC
EC 92	Reduces the glazing amount in the standard reference design to 15% from 18%	IECC
EC 99	Disallows the use of site energy and allows "source energy" for performance calculation.	IECC
EC 101	Permits code officials to require documentation of values used in software calculations for proposed design.	IECC