City of Las Vegas
International Energy Conservation Code Discussion

U.S. Department of Energy Involvement

- 1998 Commission to the International Code Council(ICC)
- 2000 International Energy Conservation Code (IECC)
- DOE challenge between 2006 and 2009 IECC.
- DOE goal of “Net Zero” by 2030
- A Federal Energy Code?

State of Nevada Involvement

- State of Nevada Energy Office
- Nevada Revised Statute 701
- LCB file number R024-11 to the Nevada Administrative Code
- Nevada Revised Statute 278

City of Las Vegas Involvement

- Model Energy Code
- International Energy Conservation Code
- City as a leader in sustainability

International Code Council Code Adoption Process

- ICC created in 1994
- National Model Codes
- Code Cycle
- Code Amendments

How the International Energy Code Works

- Three Methods
- Residential and Commercial Construction
  - New construction
  - Residential remodels, additions
  - Commercial Alterations, additions (masonry buildings)

Cost of IECC Compliance

STATE	ADDITIONAL COSTS	ANNUAL ENERGY COST SAVINGS	SIMPLE PAYBACK PERIOD (IN YEARS)
UTAH	$2,286.43	$253.11	9.0
TEXAS	$2,116.00	$287.00	7.5
SOUTH CAROLINA	$1,185.50	$487.00	2.4
AVERAGE	$1,862.64	$342.37	6.3

SUMMARY OF 2012 IECC COST IMPACTS TO SINGLE-FAMILY DWELLINGS CONSTRUCTED IN CLIMATE ZONE 3 COMPARED TO 2009 IECC

- Single Family Residential
  - Nevada 2009 Code
  - Other similar States

Residential Impact

Table 4 Annual Energy Costs and Percentage Savings Vs. 2006 IECC

Annual Energy Cost ($)				*Total savings 2009 IECC vs. 2006 IECC*		
2006 IECC		*2009 IECC*				
Heating	Cooling	Heating	Cooling	Savings ($/yr)	Percent Savings	Tons of CO_2 Saved
$127	$805	$110	$697	$125	13.4%	0.21

Table 5 Annual Energy Costs and Percentage Savings Vs. 2003 IECC

Annual Energy Cost ($)				*Total savings 2009 IECC vs. 2003 IECC*		
2003 IECC		*2009 IECC*				
Heating	Cooling	Heating	Cooling	Savings ($/yr)	Percent Savings	Tons of CO_2 Saved
$138	$814	$110	$697	$145	15.2%	0.31

Residential Impact (cont.)

Table 6 Impacts to Consumers' Cash Flow from Compliance with 2009 IECC

	Cost Impact	
	2003 to 2009 IECC	2006 to 2009 IECC
Down payment and other upfront costs	$265	$169
Annual energy savings	$145	$125
Annual mortgage increase	$76	$48
Net annual cash flow savings	$78	$85

Commercial

Table 6: Energy Use and Cost Savings Comparison (percentage)

Mesa, AZ – Energy End Use Percentage Savings								
	2009 IECC				ASHRAE 90.1-2007			
	vs. 2003 IECC		vs. 2006 IECC		vs. 2003 IECC		vs. 2006 IECC	
Building Prototype	EUI	Cost	EUI	Cost	EUI	Cost	EUI	Cost
Multifamily	29.4%	29.3%	9.5%	9.9%	30.6%	30.3%	10.5%	10.7%
Medium office	10.6%	10.3%	4.4%	4.1%	7.7%	7.9%	1.7%	1.9%
Small retail	14.5%	13.0%	6.8%	6.0%	11.8%	10.9%	4.3%	4.0%
Large warehouse	26.1%	24.8%	5.0%	4.5%	21.6%	20.9%	1.2%	1.3%

Cost of IECC Compliance (cont.)

Insulating Material	Installation Cost Per Square Foot	Total Installed Costs for Modeled Building	Simple Payback Period (Years)
XPS, 2", R-10 Closed-Cell Spray	Range of $0.95 -$1.30	$8,238 - $11,274	4.0 – 5.4
Polyurethane Foam, 2", R-12	Range of $1.80 - $2.25	$15,609 - $19,512	7.5 – 9.4
Polyiso, 2", R-12	Range of $1.10 - $1.50	$9,539 - $13,008	4.5 – 6.3
Average	Range of $1.28 - $1.69	$11,129 - $14,598	5.3 – 7.0

Financial Assistance

- City of Las Vegas Quick Start Program
- State of Nevada Energy Office
- Internal Revenue Service
- Nevada Energy
- Southwest Gas

Public Policy Questions

- Do the increased costs, energy consumption reduction, energy cost savings and simple payback periods of complying with the IECC warrant the continuation of the practice of adoption of that code by the City of Las Vegas or the adoption of further amendments to the code?

- Do the increase cost, energy consumption reduction, energy cost savings and simple payback periods of complying with the IECC for projects located in the Downtown Redevelopment Area warrant the continuation of adopting that code by the City of Las Vegas or further amendments to that code?

- Do the increase costs of compliance with the IECC warrant increasing Quick Start Program grants for older buildings located in the Downtown Redevelopment Area in which new heating, ventilating or cooling equipment is to be installed where no such equipment previously existed, in order to off-set those costs?

- Should the City of Las Vegas disregard the statutory prohibition against adopting energy efficiency and standards that are less restrictive than those adopted by the State Office of Energy by amending the IECC to provide less restrictive energy regulations for businesses located in the Downtown Redevelopment Area?

Questions?

ITEM 41

WHITE PAPER REGARDING CITY OF LAS VEGAS ADOPTION, AMENDMENT AND ENFORCEMENT OF THE INTERNATIONAL ENERGY CONSERVATION CODE (IECC)
April 29, 2013

INTRODUCTION

This white paper will briefly discuss the development, adoption and implementation of the *International Energy Conservation Code* (IECC) by the City of Las Vegas. The national and state benefits of adoption of updated editions of the IECC are discussed as well as the cost of IECC compliance, resultant energy costs savings and simple payback period projections are presented. Finally, several public policy questions regarding the IECC are offered for discussion.

DEVELOPMENT OF THE IECC

Reeling from the National Energy Crisis of 1974 and the unstable energy prices that followed throughout the next decades, in 1988, a group of building code officials saw the need for a formal minimum model standard code to address basic minimum energy efficiency and occupant comfort requirements for conditioned residential and commercial buildings. The Council of American Building Officials (CABO), a consortium of the predominant model building code agencies in the US at that time, teamed with the American National Standards Institute (ANSI) to develop the first national *Model Energy Code* (MEC).

Facing mounting evidence of the existence and resulting consequences of global warming, the federal government, through the Environmental Protection Agency and the Department of Energy, joined the increasing number of organizations involved in the process of identifying, defining and measuring the sources of carbon emissions delivered into the atmosphere in order to slow their ramifications. As more scientific information became available, in 1998, the Department of Energy (DOE) became directly involved with the energy code development process, commissioning the newly formed coalition of building code officials, with their consensus driven code development process, the Internationals Code Council (ICC), to work with the American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) and all interested parties, in developing a consensus model energy code that could be used throughout the US and around the world for both new construction and for alterations to existing buildings. Thousands of interested parties from around the country participated in the development of this consensus draft. The first edition of that code, the *2000 International Energy Conservation Code* (IECC) incorporated the requirements of the MEC and further

defined the building components, measurement techniques and minimum requirements related to the conservation of energy and energy efficiency. Due to rapid growth in emerging energy efficiency technologies, materials and methods of construction, the IECC is updated every 3 years in order to stay current.

In 2005, the energy code consensus body, led by the DOE, set an ambitious goal for the future of the energy codes. The ultimate goal is that all new building constructed in 2030 would result in "Net Zero" energy usage. Between the International Code Council's publication of the 2006 and 2009 codes, the United States Energy Department asked the ICC to use its collaborative process to develop an energy code that would reduce the energy consumption of the buildings in the United States 30% by the year 2020. This goal was accompanied by a commitment from DOE that if such a code was not developed by ICC, DOE would create a National Energy Code at the federal level. Thus the ICC developed standards in the 2009 IECC that provide a 12% reduction in building energy consumption, with the remaining 18% anticipated to be accomplished in the 2012 IECC.

STATE OF NEVADA IECC ADOPTION

Nevada Revised Statutes (NRS) 701.150 established the Office of Energy within the Office of the Governor. NRS 702.190 requires the Director of that office to prepare a comprehensive state energy plan that includes the development or incorporation by reference of model and uniform building and energy codes and standards which are written in language that is easy to understand and which include performance standards for conservation of energy and energy efficiency. NRS 701.200 provides that the Director may recommend to state agencies, local governments and appropriate private persons and entities, standards for conservation of energy and its sources and for the carrying out the comprehensive state energy plan. NRS 701.220(1) provides that the Director shall adopt regulations for the conservation of energy in buildings, including manufactured homes. Such regulations must include the adoption of the most recent version of the *International Energy Conservation Code*, issued by the International Code Council, and any amendments to the *Code* that will not materially lessen the effective energy savings requirements of the *Code* and are deemed necessary to support effective compliance and enforcement of the *Code.* The statute further provides that the regulations must provide for the adoption of the most recent version of the *International Energy Conservation Code*, and any amendments thereto, every third year.

NRS 701.220(4) provides that the standards adopted by the Director are the minimum standards for the conservation of energy and energy efficiency in this State. The statutes further provide that the governing body of a local government that is authorized by law to adopt and enforce a building code is required to:

(a) Except as otherwise provided in paragraph (b), incorporate the standards adopted by the Director in its building code;
(b) May adopt a higher or more stringent standards and must report such higher or more stringent standards, along with supporting documents, to the Director, and
(c) Enforce the standards adopted.

Pursuant to the NRS enabling legislation, the Director adopted regulations that are contained in the document titled "Adopted Regulation of the Directors of the Office of Energy (LCB File No. R024-11) with a statewide effective date of July 1, 2012. Section 4(1) of that document adopted the *2009 International Energy Conservation Code* by reference. Section 4(2) provides that on or before July 1, 2015, and on or before July 1 of every third year thereafter, the Director will review the most recent version of the *International Energy Conservation Code*, including any amendments thereto, and will adopt by reference the most recent version of the *International Energy Conservation Code* and prescribe by regulation such amendments to the most recent version of the *International Energy Conservation Code* as the Director deems necessary to support effective compliance with and enforcement of the *International Energy Conservation Code* in this State.

Section 6(1) of the *Regulation* provides that the governing body of a local government that is authorized by law to adopt and enforce a building code may submit a petition to the Director requesting a determination by the Director that deviation from one or more standards set forth in the *International Energy Conservation Code* is necessary to support effective compliance with and enforcement of the *Code* in this State. A petition submitted pursuant to this section may propose a deviation from standards relating to:

(a) The construction of floors, walls, ceilings and roofs;
(b) The equipment and systems for heating, ventilation and air-conditioning;
(c) Electrical equipment and systems;
(d) Insulation; and
(e) Any other factors which affect the use of energy in a building.

Section (6)2 of the *Regulation* provides that a petition submitted to this section must:

(a) Be in writing;
(b) State the specific provision or provisions of the *International Energy Conservation Code* from which the deviation is being sought; and
(c) Include an explanation of how the deviation will not lessen the effective energy-efficiency of the *International Energy Conservation Code*.

Section 6(5) of the *Regulation* provides that the Director will not approve a petition submitted pursuant to this section if the deviation would result in energy efficiency requirements which are less stringent than the requirements set forth in the *International Energy Conservation Code.*

CITY OF LAS VEGAS IECC ADOPTION

The City of Las Vegas is recognized as a leader in sustainability and energy conservation. In 2005, Mayor Oscar Goodman became one of the leading proponents and honorable signatories of the National Climate Protection Agreement at the National Conference of Mayors. In addition, "Sustainability" is one of the City's three leading initiatives, and the City devotes over a third of its official website to its accomplishments in reducing carbon emissions by effective use of alternative energy sources, recycling, creating and encouraging effecting green spaces, converting to energy efficient vehicles and upgrading its municipal buildings. In the City's January 2013 quarterly *Sustainability in Action* report, is noted that "The City has made significant progress impacting energy, water, and resource infrastructure and will be diligently working with our community partners to affect changes that will help support the continued success of Las Vegas and make it America's first net zero city."

The City of Las Vegas adopted the 1992 version of the CABO/ANSI Model Energy Code in 1995, and continued to utilize that code until 2005 when the 2003 Edition of the IECC was adopted. In 2007, the 2006 IECC was adopted and in 2011, the 2009 IECC was adopted, which is the code that is in effect today.

SUMMARY OF IECC REQUIREMENTS

The IECC provides three different paths that building designers may use to meet the requirements of the codes. The "prescriptive path" prescribes how buildings are to be constructed to meet the IECC and is the easiest and most widely used method of complying with the code. The "performance or compliance software" method uses software developed to determine code compliance. The "whole building analysis" uses software that takes the entire building and performs a whole building analysis that will analyze annual total energy use.

If a building envelope (roof, exterior walls, windows, doors, floors, basement and skylights) does not comply with the IECC using prescriptive requirements, software tool such as RESCheck (for residential buildings) and COMCheck (for commercial buildings) may be used to achieve compliance. These software tools determine compliance for the building envelope based on the specifics of the building under consideration and the project's location. Using this software, the designer "builds" a description of the building, entering basic data (size, type of construction, R-value of insulation, etc.) for the building envelope elements. After the building envelope description and climate are entered, the program displays how close the envelope comes to

meeting the specified code requirements. If the envelope fails to comply, it is typically a simple matter to adjust individual elements to bring the envelope into compliance. These tools provide enhanced design flexibility over the prescriptive tables in the IECC and both are available for free download from www.energycodes.gov.

Attachment A is a summary comparison of the 2006, 2009 and 2012 IECC prescriptive requirements for single-family homes. It is important to note that where additions are to be made to an existing single-family home, only the addition need comply with the code. Where alterations are to be made to an existing home, only items being altered or installed that are regulated by the IECC need to comply with the code.

Attachment B is a summary comparison of the 2006, 2009 and 2012 IECC prescriptive requirement for commercial buildings. It is important to note that where additions are to be made to an existing commercial building, only the addition need comply with the code. Where alterations are to be made to an existing commercial building, only items being altered or installed that are regulated by the IECC need comply with the code.

COST OF 2009 IECC COMPLIANCE IN NEVADA

An analysis of the cost of complying with the 2009 IECC for homes constructed in Nevada was conducted by the Building Codes Assistance Project (BCAP), a nonprofit advocacy organization established in 1994 as a joint initiative of the Alliance to Save Energy, the American Council for an Energy-Efficient Economy, and the Natural Resources Defense Council. A summary of that analysis is in Attachment C. The analysis determined that the cost increase for complying with the 2009 IECC averaged $777 in Nevada, an increase of 0.3% in construction cost for a 2,400 square foot home with a sale price of $267,451. The impact of that increase when rolled into the average mortgage based on 30 year mortgage, with a 20% down payment and a 5.05% interest rate, results in down payment increase of $155.43, and $3.36 extra on monthly mortgage bills. The resultant monthly energy cost savings is projected to be $19.04 resulting in a payoff of the increased costs in 10 months. Thereafter, the home buyer will save $16 per month for a total return of $190 per year.

In terms of simple payback, the increase of $777 in construction cost is offset by the estimated annual energy savings of $228.48 ($19.04 per month x 12 months) resulting in a simple payback period of 3.4 years.

COST OF 2012 IECC COMPLIANCE

There currently is no published data available regarding the cost impacts of the 2012 IECC and the simple payback period for Nevada. However, analyses comparing the cost increase of

complying with the 2012 IECC as compared to the 2009 IECC for Utah, Texas and South Carolina that are located in the same Climate Zone as Las Vegas (Climate Zone 3) are available. Accordingly, the following is a summary of those analyses.

Utah

A study of the cost of complying with the 2012 IECC as compared to the 2009 IECC and the estimated simple payback period was conducted by Nexant, Inc., a private-sector energy consulting firm, for the State of Utah. The study examined the cost and payback for a single-family dwelling with a slab on grade constructed in Climate Zone 3B (St. George). It should be noted that Clark County, Nevada is also located in Climate Zone 3B and the majority of homes constructed in the City of Las Vegas are built on concrete slabs on grade. The study determined that the increase cost of complying with the 2012 IECC as compared to the 2009 IECC was $2,286.43. The annual energy cost savings was projected at $253.11, resulting in a simple payback period of 9 years.

Texas

A study of the cost of complying with the 2012 IECC as compared to the 2009 IECC and the simple payback period for single-family and multi-family buildings constructed in Texas was conducted by the Pacific Northwest National Laboratory on behalf of the U.S. Department of Energy. The study determined that the increase cost of complying with the 2012 IECC as compared to the 2009 IECC in Climate Zone 3B (the same climate zone as Clark County, Nevada) for a two-story 2,400 square foot single-family dwelling was $2,116. The annual energy cost savings was projected at $287, resulting in a simple payback period of 7.5 years.

South Carolina

A study of the cost of complying with the 2012 IECC as compared to the 2006 IECC and the estimated simple payback period was conducted by MC2 Mathis Consulting Company for the South Carolina Energy Office. Both South Carolina and Clark County, Nevada are located in Climate Zone 3; however, South Carolina is located in Climate Zone 3A which is considered moist, while Clark County is located in Climate Zone 3B which is considered dry. The study was based upon a 1,200 single family home, and a 2,000 single family home, of wood construction erected on a concrete slab on grade. The study determined that the increase cost of complying with the 2012 IECC as compared to the 2006 IECC for the two homes averaged $1,186. The annual energy cost savings was projected at $48, resulting in a simple payback period of 2.4 years.

Southern Nevada EnergyStar Homes

It is important to note that the latest data released from the Southern Nevada Home Builders Association indicates that an average of 64% of all the homes built and sold in Southern Nevada between 2009 and 20011 were designed and constructed as EnergyStar homes. In order to

qualify as an EnergyStar home, the measurable energy efficiency must out-perform the standard IECC code compliant residential home by 15%. Out of the 64% of EnergyStar homes constructed in Southern Nevada, 30 % met or exceeded EnergyStar Plus standards and provided 30% better energy efficiency performance than a standard IECC code compliant house. This above-code efficiency is not mandated by law or code, but rather is drive by the market place.

Summary

The following table summarizes the findings of the studies conducted in Utah, Texas and South Carolina regarding the cost impacts of the adoption of the 2012 IECC as compared to the 2009 IECC for single-family dwellings.

SUMMARY OF 2012 IECC COST IMPACTS TO SINGLE-FAMILY DWELLINGS CONSTRUCTED IN CLIMATE ZONE 3 COMPARED TO 2009 IECC

STATE	ADDITIONAL COSTS	ANNUAL ENERGY COST SAVINGS	SIMPLE PAYBACK PERIOD (IN YEARS)
UTAH	$2,286.43	$253.11	9.0
TEXAS	$2,116.00	$287.00	7.5
SOUTH CAROLINA	$1,185.50	$487.00	2.4
AVERAGE	**$1,862.64**	**$342.37**	**6.3**

A. Multi-Family Dwellings

In that no analysis could be located comparing the increase cost of complying with the 2012 IECC as compared to the 2009 IECC for multi-family dwellings constructed in Southern Nevada, information from an analysis conducted for the state of Texas is included in that Texas is in the same Climate Zone as Southern Nevada (i.e. Climate Zone 3).

Texas

The previously referenced Texas study identified the increase cost of complying with the 2012 IECC as compared to the 2009 IECC for a three-story apartment building with 6 units per floor, with each unit having a floor area of 1,200 square feet. The study determined that the per unit cost increase was $979, and the payback period was calculated to be 6.3 years.

National Multi Housing Council and National Apartment Association (NMHC/NAA)

A study of the cost of complying with the 2012 IECC as compared to the 2009 IECC was conducted by Niles Bolton Associates, Inc. on behalf of the National Multi Housing Council and

the National Apartment Association. The study assumed a 3-story apartment building with 9 units per floor, each with a gross floor area of 1,130 square feet constructed in Climate Zone 3 (same as Clark County, NV). The study determined that the cost increase of comply with the 2012 IECC as compared to the 2009 IECC averaged $1,991 per unit. The study did not discuss energy costs savings nor did it discuss projected payback periods.

DOWNTOWN REDEVELOPMENT AND THE IECC

Commercial Alterations (Tenant Improvements)

It is important to note that where tenant improvements are to be made to an existing commercial building in the Downtown Redevelopment Area (and elsewhere in the city), only those items being altered or installed that are regulated by the IECC need to comply with the code. However, if the tenant improvement is to be made to an existing building or tenant space that does not have heating, ventilating or air-conditioning equipment and the work involves the installation of such new equipment, the entire tenant space must be brought into compliance with the IECC. For example:

- If a new tenant is moving in to an existing conditioned space and is not making any changes to the exterior walls or roof/ceiling, then nothing is required to comply with the IECC building envelope requirements (walls, roofs, windows and doors). However, if the tenant decides to add an additional window or door in an exterior wall, that new door or window must meet the IECC requirements for a new door or window. The majority of tenant improvements constructed in Las Vegas fall within this category.
- If the new tenant is adding on to an existing building, only the new addition must meet all IECC requirements. Areas of the building not being modified by the addition are allowed to remain as an existing condition.
- If a tenant is changing out or adding additional lighting in an existing space, then the IECC lighting power allowances must be recalculated, and the new lighting power usage is required to come in under the allowed budget for the type of use of the space.
- If a tenant is adding additional heating, ventilating or air-conditioning equipment to the space, the new unit must be correctly sized pursuant to the IECC. In order to demonstrate compliance, sizing calculations are required. Any new ducting would have to be sealed and insulated per the IECC prescriptive requirements for new ducts. The existing heating, ventilating and air-conditioning equipment is allowed to remain as an existing condition.

Change of Use or Occupancy

Buildings, and portions thereof, are classified by the *International Building Code* based upon the uses that are to occur within the building as follows:

Group A Assembly:	Churches, Tavern and Bars, Night Clubs, etc.
Group B Business:	Professional Services, Banks, Outpatient Clinics, etc.
Group F Factory:	Textiles, Cabinet Shops, Furniture, etc.
Group H High-Hazard:	Use of materials constituting a denotation hazard, Deflagration hazard, physical hazard or health hazard
Group I Institutional:	Hospitals, Assisted Living, Jails, Alcohol Centers, etc.
Group M Mercantile:	Department Stores, Markets, Drug Stores, etc.
Group R Residential:	Hotels, Motels, Apartments, Live Work Units, Houses.
Group S Storage:	Storage of Tire, Books, Furniture, etc.
Group U Utility:	Carports, Barns, Sheds, Private Garages, etc.

The IECC provides that where a building or space within a building is undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy, the building or space must comply with the code. In addition, the IECC provides that where a building or space that does not have heating, ventilating or air-conditioning equipment is undergoing alteration that includes the installation of new heating, ventilating or air-conditioning equipment, the building or space must be brought into full compliance with the code. For example, if an existing unheated or uncooled auto repair garage or warehouse was being changed to habitable space such as professional offices, retail store or a church and heating and/or cooling equipment was being installed, then that portion of the building being heated or cooled must be brought into compliance with the IECC. It should be noted that Department records indicate that out of the approximately 1,800 tenant improvement permits issued under the 2009 IECC, there have been three buildings in the entire that were required by the Building Department to meet full IECC requirements due failure of the design professional to address heating and cooling equipment being installed in buildings. There have been 18 projects out of the 1,800 that have required full compliance with all of the elements of the IECC, which equates to 1% of all tenant improvements approved in the City under the 2009 IECC.

Existing Masonry Buildings

Where tenant improvement are to be made to an existing masonry building, only those items being altered or installed that are regulated by the IECC need to comply with the code. Where new heating, ventilating and cooling equipment is to be installed in an existing masonry building that previously did not have such equipment, the heated or cooled space must be brought into compliance with the IECC.

In that older masonry walls do not meet the insulation requirements of the IECC, typically new insulation must be applied to the interior or exterior of the structure. The National Concrete Masonry Association notes that insulation can be applied to the interior side of the masonry using rigid insulation attached directly to the wall or utilizing wood or steel furring, or to the exterior. In a publication titled "Measure Guideline: Installing Rigid Foam Insulation on the Interior of Existing Brick Walls" dated June, 2012 published by the U.S. Department of Energy, the cost of installing insulation on the walls of existing brick buildings was discussed. The model used for costing analysis was a multi-family building that was 7,600 square feet in area, with eight apartments of approximately 950 square feet each, located in New York City (Climate Zone 4). The total wall area to be covered by the new insulation was calculated to be 8,672 square feet. The following table shows the cost of installing three different types of products on the brick walls to comply with IECC requirements, and the simple payback period for each.

Cost Range (Labor and Materials) and Simply Payback Period for Interior Insulating Of 8,672 Square Feet of Brick Walls

Insulating Material	Installation Cost Per Square Foot	Total Installed Costs for Modeled Building	Simple Payback Period (Years)
XPS, 2", R-10 Closed-Cell Spray	Range of $0.95 -$1.30	$8,238 - $11,274	4.0 – 5.4
Polyurethane Foam, 2", R-12	Range of $1.80 - $2.25	$15,609 - $19,512	7.5 – 9.4
Polyiso, 2", R-12	Range of $1.10 - $1.50	$9,539 - $13,008	4.5 – 6.3
Average	**Range of $1.28 - $1.69**	**$11,129 - $14,598**	**5.3 – 7.0**

Financial Assistance

Through the "Quick Start Program" administered by the Department of Economic and Urban Development, the City provides financial assistance in the form of grants for property and/or business owners for undertaking the rehabilitation of commercial or industrial property located in the Redevelopment Area (RDA) and Redevelopment Area #2 (RDA 2). The City will rebate, up to a maximum of fifty thousand dollars ($50,000), any qualifying Building/Site Infrastructure Improvements. The grants are based upon specified "Funding Priorities" and the No. 2 priority is "Projects for which the existing building or site improvements are substantially dilapidated and/or non-conforming to present city codes and standards." In that the City has adopted the IECC, grant funds may be utilized to off-set the cost of building improvements required to comply with the requirements of that code.

The United State Internal Revenue Service Sub-Section 179D allows commercial business owner to receive a federal tax deduction, commonly known as EPACT, resulting in a tax deduction of

up to $1.80 per square foot for qualifying energy efficiency measures installed in commercial buildings.
Financial incentives are available through the State of Nevada Office of Energy for property tax incentives, rebates, loans and utility rebates for financial help in relation to costs for installing energy efficiency measures in buildings. This program is available in conjunction with a national program known as DSIRE, Database of State Incentives and Efficiency. The program is a joint effort by North Carolina State University and the United States Department of Energy to promote and incentivize the installation of energy efficiency measures.

NATIONAL BENEFITS OF IECC ADOPTION

According to the Department of Energy's "*Energy Information Administration Energy Consumption by Sector Overview*", 5 million commercial buildings and 115 million residential households in the US consume nearly 40% of all of the nation's primary energy. These same buildings use 70% of all of the electricity generated in the US.

Energy Codes Reduce Emissions

The use of energy creates considerable emissions of CO2. The amount of C02 attributed to lighting, heating, cooling, cooking, refrigeration, water heating, and other building services totaled 2.5 billion metric tons[3] which is 4% of the US total, and 8 % of the global total. The projected energy savings from adoption and enforcement of energy codes translates into an estimated cumulative savings by 2030 of 800 million metric tons of CO2--equivalent to the removal of 145 million vehicles.

Energy Codes Reduce Energy Costs

Enforcement of energy codes are estimated to produce a financial benefit to building owners of nearly $4 billion dollars annually by 2015, rising to over $30 billion dollars annually by 2030. The benefit is achieved by saving over 14 quadrillion Btu's of energy from 2009-2030, an estimated annual savings of 3.5 quadrillion Btu's by 2030. This is equivalent to power generated by 260 medium (450 MW) power plants. Studies show that transforming the building sector to employ more energy efficient designs, equipment and solar power could cut projected overall household energy expenses in 2030 from $285 billion to $130 billion. Failing to catalyze building-sector transformations will raise the cost of meeting long-term climate goals by at least $500 billion per year globally.

Energy Codes Create Jobs

The innovative use of improved technology in buildings and the increasing need for energy code experts will create employment opportunities around the nation. As new codes are developed for greater energy efficiency in buildings, new jobs are anticipated to become available, including technical experts, duct and building leakage professionals, quality control assessors, building and

system commissioning agents, energy auditors and compliance officers. Completing project retrofits and building weatherization will create new employment opportunities as well.

NEVADA BENEFITS OF IECC ADOPTION

The benefits to the state of Nevada related to the adoption of the IECC were presented in a study titled "Nevada Energy Efficiency Strategy" published by Southwest Energy Efficiency Project in 2005 under the auspices of the Nevada State Office of Energy. That study noted that local jurisdictions in Nevada had initiated the process of adopting the 2003 IECC. The study recommended a statewide policy be developed to encourage local jurisdictions to adopt that code and further recommended the Nevada legislature consider adopting the code statewide.

The study estimated the energy savings and peak demand reduction from upgrading energy codes by making assumptions about the construction rates in the state during 2006-2020, the fraction of new homes and commercial buildings that would be affected by new energy codes, and the energy savings per home and per unit of floor areas in commercial buildings, in homes and in commercial buildings influenced by the code. The study assumed 48% of new single family homes statewide and 15% of new commercial floor space already met or exceed the energy efficiency levels of the 2003 IECC and therefore were not affected by the new codes. In addition, the study assumed electricity savings levels of 26% in new homes and 32% in new commercial buildings for those buildings affected by the code. The study further assumed natural gas savings of 11% in new homes and 33% in new commercial buildings for buildings affected by the code.

The following table shows the resulting electricity savings and peak demand reductions in 2010, 2015, and 2020 based on the above assumptions. The study projected electricity savings could reach nearly 3,500 GWh/yr and 1,400 MW of peak demand by 2020. The GWh/yr column reflects the savings in gigawatts per hou, where 1 gigawatt is equal to 1000 megawatts (MW). The study noted that 80% of the electricity savings would come from new commercial buildings and less than 20% from new homes. The study did not include savings from new apartment buildings.

Projected Electricity Savings and Peak Demand Reduction from Updated Building Energy Codes

Sector	Electricity savings (GHWh/yr)			Peak demand reduction (MW)		
	2010	2015	2020	2010	2015	2020
Residential	208	386	623	83	154	249
Commercial	797	1789	2866	319	716	1146
All	1005	2175	3489	402	870	1395

The study further projected the resulting gas savings in 2010, 2015 and 2020. It was estimated that the gas savings could reach nearly 4 billion cubic feet per year by 2020 with 73% of the savings coming from new commercial buildings and 27% from new homes. The following table shows the gas savings whereby "bcf/yr" represents 1 billion cubic feet which is equal to 1 trillion Btus.

Projected Gas Savings from Updated Building Energy Codes

Sector	Gas savings (bcf/yr)		
	2010	2015	2020
Residential	0.36	0.67	1.08
Commercial	0.80	1.80	2.88
All	1.16	2.47	3.96

The study further projected that adopting new energy codes would lead to approximately $930 million in investment in energy efficiency measures during 2006-2030 and the resulting energy bill savings could reach $104 million per year by 2010, $223 million per year by 2015, and $358 million by year 2020 based on 2004 dollars.

CITIZEN BENEFITS OF IECC ADOPTION

In addition the national and state benefits of adoption of the IECC previously discussed, citizens benefit from the adoption of the IECC by reduced monthly gas and electric bills resulting from less energy consumption due to more energy efficient homes. Attachment C indicates that monthly savings would be $19.04 per month for homes in Southern Nevada.

PUBLIC POLICY QUESTIONS

The following are a few public policy questions that may be taken into consideration regarding the continuation of the practice of adopting the most recent edition of the IECC by the City of Las Vegas:

1. Do the national and state benefits of adoption of the latest edition of the IECC as discussed herein warrant the continuation of the practice of adoption of that code by the City of Las Vegas or the adoption of further amendments to the code?

2. Do the increased costs, energy consumption reduction, energy cost savings and simple payback periods of complying with the latest edition of the IECC as discussed

herein warrant the continuation of the practice of adoption of that code by the City of Las Vegas or the adoption of further amendments to the code?

3. Do the increase cost, energy consumption reduction, energy cost savings and simple payback periods of complying with the latest edition of the IECC for projects located in the Downtown Redevelopment Area as discussed herein warrant the continuation of the practice of adopting that code by the City of Las Vegas or further amendments to that code?

4. Do the increase costs of compliance with the IECC warrant increasing Quick Start Program grants for older buildings located in the Downtown Redevelopment Area in which new heating, ventilating or cooling equipment is to be installed where no such equipment previously existed, in order to off-set those costs?

5. Should the City of Las Vegas disregard the statutory prohibition against adopting energy efficiency and standards that are less restrictive than those adopted by the State Office of Energy by amending the IECC to provide less restrictive energy regulations for businesses located in the Downtown Redevelopment Area?

ATTACHMENT A

Prescriptive Code Requirement for Single Family Dwelling
Comparison by IECC Code Year

Building Component	2006 Prescriptive Requirements	2009 Prescriptive Requirements	2012 Prescriptive Requirements
Ceiling/roof R-values	R-30 installed in direct contact with underside of roof sheathing (no vents in attic) OR installed between bottom members of trusses directly against the attic side of ceiling drywall	Same as 2006	R-38 installed per 2006 method
Exterior wood framed walls R-value	R-13	R-13 installed between wall stud framing	R-20 batts in stud cavity or R-13 in stud cavity on interior + R-5 continuous (foam board) on exterior side
Mass wall above grade (CMU or concrete) R-value ab	R-5 (1" foam board), either continuous on exterior side or installed between furring on interior side	R-5 (1" foam board) installed continuous glued to the exterior side or R-13 batts installed between furring on interior side	R-8 continuous on exterior side (2" foam board) or R-13 installed between furring on interior side
Flooring over outside or unconditioned space	R-19 installed against directly against the underside of floor decking	Same as 2006	Same as 2006
Basement walls enclosing conditioned living space	No requirement	R-5 (1" foam board) installed continuous glued to exterior surface OR R-13 batt insulation installed between furring strips on interior side.	Same as 2009
Slab edges for unheated slabs	No requirements	No requirements	No requirements

Building Component	2006 Prescriptive Requirements	2009 Prescriptive Requirements	2012 Prescriptive Requirements
Slab edges for radiant floor slabs	R-5 (1" foam board) installed continuously around slab edge	Same as 2006	Same as 2006
Crawl space walls surrounding unconditioned space	R-19 at underside of floor with ventilation underneath	Same as 2006	Same as 2006
Crawl space walls surrounding conditioned space	R-5 1" foam board installed continuously on the exterior side OR R-13 batt insulation installed between stud furring on the interior side, w. vapor barrier on ground	Same as for 2006	Same as for 2006
Window U-factor rating:	U-0.65	U-0.50	U-0.35
Window Solar Heat Gain performance rating (includes skylights:	0.40	0.30	0.25
Skylight U-factor performance rating	U-0.75	U-0.65	U-0.55
Building air tightness	Building thermal by-pass visual inspection for sealing all air barriers, windows doors, bottoms of walls, attic access, etc.	Same as 2006 Or provide a blower door test	All home to have a blower door test or meet or exceed EnergyStar or equal standard protocol

NOTE: These prescriptive requirements apply to all room additions, but only for the newly added areas. The remainder of the home to remain as-built. For remodel, renovation or repair only projects, just the individual component items that are being added, changed, altered or repaired must meet the above requirements for the individual components, as applicable.

ATTACHMENT B

Prescriptive Code Requirement for New Commercial Buildings
Comparison by IECC Code Year

Building Component	2006 Prescriptive Requirements	2009 Prescriptive Requirements	2012 Prescriptive Requirements
Roofing:			
Roof insulation installed entirely above the deck	R-15 (3" foam board) continuous on roof deck with waterproof membrane covering	R-20 (4" foam board or equal) applied directly to roof deck with waterproof membrane covering.	Same as for 2009
Roofing-metal building with minimum R-5 (1" foam) thermal blocking between roof sheathing and framing members	R-19 between framing members	R-13 batts installed between framing members on the interior side of sheating + R-13 batts draped under steel perlins.	R-19 batts installed between framing members on the interior side of sheating + R-11 batts installed directly under steel perlins
Wood framed attic space	R-30 installed between top chords of framing trusses/members or laid in attic side of drywall between framing members	R-38 installed between top chords of framing trusses/members or laid in attic side of drywall between framing members	Same as for 2009
Walls above grade:			
Mass walls (concrete or concrete blocks)	R-5.7 (1' foam board or equal) installed continuously glued to surface on interior or exterior side. OR, for concrete blocks, all empty cells insulated w. vermiculite or equal.	R-7.6 (1.5" foam board or equal) installed continuously, glued to the exterior or interior surface.	Same as for 2009

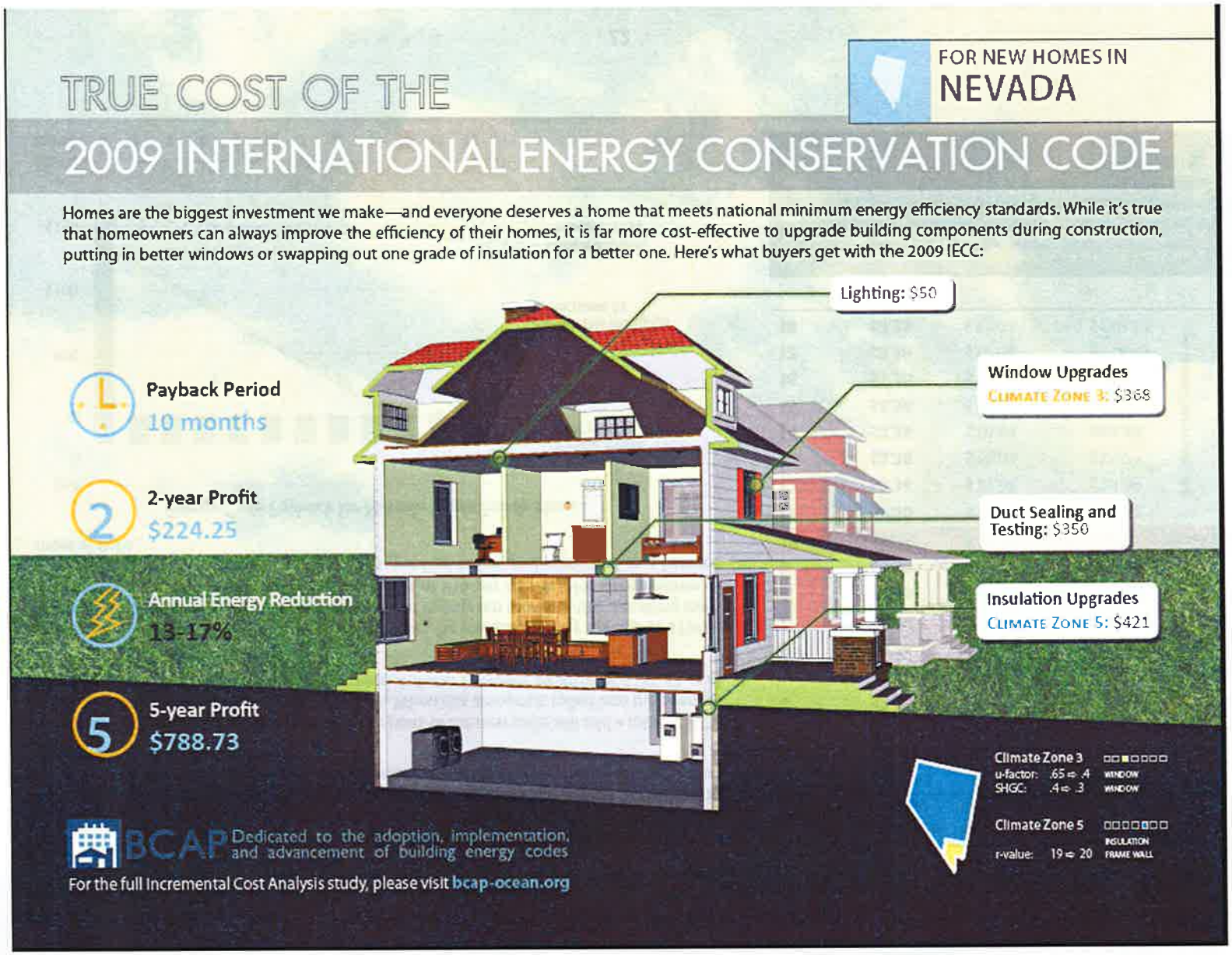
Building Component	2006 Prescriptive Requirements	2009 Prescriptive Requirements	2012 Prescriptive Requirements
Walls above grade (cont).			
Metal buildings:	R-13 installed before metal wall framing/girts installed and compressed when skin is attached	R-13 batt insulation between stud/framing cavities on the interior side of the sheathing + R-3.8 (1" foam board or equal) installed continuously on the interior or exterior side of the metal sheathing	R-13 batt insulation between stud/framing cavities on the interior side of the sheathing + R-6.8 (1.5" foam board or equal) installed continuously on the interior or exterior side of the metal sheathing
Metal framing used in exterior walls	R-13 installed between the stud cavities	R-13 batts installed in steel stud truss bays + R-3.8 (1" foam board or equal) installed continuously on exterior face of building	R-13 batts installed in steel stud truss bays + R-7.5 (2" foam board or equal) installed continuously on exterior face of building
Wood framed and other walls	R-13 batts installed between stud cavities directly against exterior sheathing	Same as for 2006	R-13 batts installed between stud cavities directly against exterior sheathing + R3.8 (foam board or equal) installed continuously on the exterior side, OR, R-20 installed between 2X6 wall stud directly against the wall exterior sheating
Walls below grade:	No requirements	No requirements	No requirements
Floors:			
Mass floors (concrete decking) over outside air or unconditioned spaces	R-5 (foam board, spray or batts) installed continuously directly against the decking (top or underside)	R-6.3 (1.5" foam board, spray or batts) installed continuously against the decking	R-510 (foam board, spray or batts) installed continuously directly against the decking (top or underside)
Joist/framing	R-19 batts installed in direct contact with the underside of the floor decking	Same as for 2006	R-30 batts installed in direct contact with the underside of the floor decking

Slab on grade floors:			
Unheated slabs	No requirement	No requirement	No requirement
Building Component	**2006 Prescriptive Requirements**	**2009 Prescriptive Requirements**	**2012 Prescriptive Requirements**
Slab on grade floors:			
Radiant floor heated slabs	R-7.5 (rigid foam board or equal) installed continuously to the exterior side of slab and down 12" minimum.	R-10 (rigid foam board or equal) installed continuously to the exterior side of slab and down 24" minimum.	Same as for 2009
Non-glazed exterior doors:			
Swinging:	U-factor = 0.70	U-factor = 0.70	U-factor = 0.61
Roll-up or sliding doors:	U-factor = 1.45	U-factor = 1.45	R-4.75 interior side insulation installed against door surface
Windows and glazing:			
Fixed windows with non-metal frames (shown as performance U-factor heat loss rating)	0.65	Same as 2006	0.46
Operable windows	0.65	Same as 2006	0.60
Curtain walls:	0.60	Same as 2006	0.46
Entrance doors (<50% glass)	0.90	Same as 2006	0.77
All other window types	0.65	Same as 2006	0.46
Solar Heat Gain Coefficients: (gain rating from radiation due to solar heat) with projection factors (awnings, extended eaves or porches covering a % of window)			
Solar heat gain coefficient with less than 25% max. of widow shaded	0.25	Same as 2006	Same as 2006
SHGC with shading of >25% but <50%	0.33	Same as 2006	0.30 based on calculation
SHGC with shading of >50%	0.40	Same as 2006	Same as 2006

Building Component	2006 Prescriptive Requirements	2009 Prescriptive Requirements	2012 Prescriptive Requirements
Skylights (3% maximum or roof area)			
Glass skylights U-factor	0.40	0.65	0.55 (5% of roof area allowed with daylighting calculations
Glass skylight SHGC:	0.40	0.35	Same as 2009
Plastic lense skylights U-factor:	1.30	0.65	0.55
Plastic lense skylights SHGC:	0.35	Same as 2006	Same as 2006

NOTE: These prescriptive requirements apply to all building additions, but only for the newly added areas. The remainder of the building to remain as-built. For remodel, renovation or repair only projects, just the individual component items that are being added, changed, altered or repaired must meet the above requirements for the individual components, as applicable.

ATTACHMENT C



TRUE COST OF THE 2009 INTERNATIONAL ENERGY CONSERVATION CODE

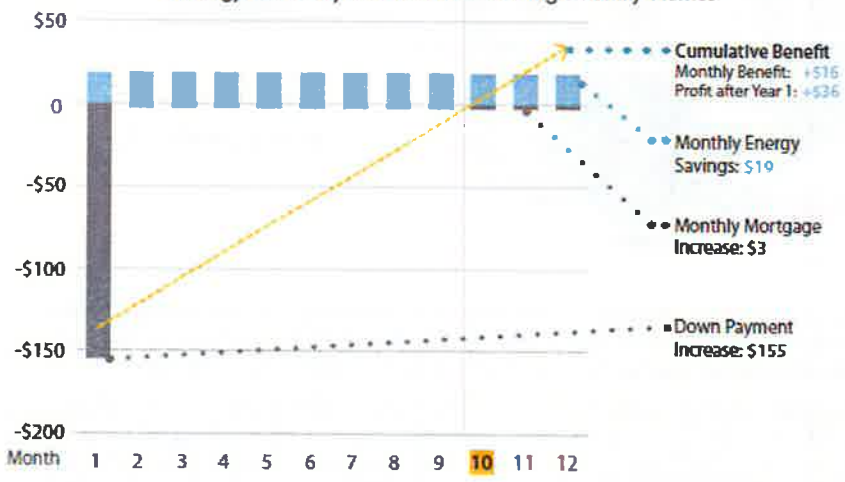
FOR NEW HOMES IN **NEVADA**

One of the major barriers to energy code adoption across the country is the concern that new codes will add to the purchase price and potential buyers will not be able to afford the homes they want. In Nevada, upgrading homes to the 2009 International Energy Conservation Code will actually reduce out-of-pocket expenses for homeowners – paying off their initial investment in a matter of months.

For the average new home, BCAP estimates the costs of the new code will add a total of $777 in construction costs—an increase of only 0.3%. When this amount is rolled into the average mortgage, real costs to homebuyers will mean a down payment increase of $155.43, and $3.36 extra on monthly mortgage bills.

These added mortgage costs will be offset, however, by monthly energy savings of $19.04, helping homebuyers pay off their initial investment in only ten months. After breaking even in month ten, the home will return buyers a profit of $16 per month—for a total return of $190 every year. This return on investment is graphed below and presented as a balance sheet at right.

Energy Code Payback for Nevada Single Family Homes



Month	Mortgage Increase	Monthly Energy Savings	Cumulative Cost/Benefit	
1	$155.43	$19.04	-$136.39	
2	$3.36	$19.04	-$120.71	
3	$3.36	$19.04	-$105.03	
4	$3.36	$19.04	-$89.35	
5	$3.36	$19.04	-$73.67	
6	$3.36	$19.04	-$57.99	
7	$3.36	$19.04	-$42.31	
8	$3.36	$19.04	-$26.63	
9	$3.36	$19.04	-$10.95	
10	$3.36	$19.04	$4.73	Break Even
11	$3.36	$19.04	$20.41	
12	$3.36	$19.04	$36.09	
13	$3.36	$19.04	$51.77	
14	$3.36	$19.04	$67.45	
15	$3.36	$19.04	$83.13	
16	$3.36	$19.04	$98.81	
17	$3.36	$19.04	$114.49	
18	$3.36	$19.04	$130.17	

$16 profit every month →

This model assumes an average sale price of $267,451 for a 2,400 square foot home. The mortgage is conservatively set at 30 years, with 20% down and the current average nationwide interest rate of 5.05%. With a lower down payment—such as 10% down—consumers will break even on their investment even sooner.

BRIAN SANDOVAL
Governor

STATE OF NEVADA

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GOVERNOR'S OFFICE OF ENERGY

May 1, 2013

Honorable Mayor Carolyn Goodman
City of Las Vegas City Council Members
495 Main Street
Las Vegas, NV 89101

RE: Agenda Items 41 and 61 and the 2009 International Energy Conservation Code

Dear Mayor Goodman and City Council Members;

The Governor's Office of Energy appreciates the opportunity to make a few remarks regarding the International Energy Conservation Code as it pertains to Agenda Items 41 and 61 on your May 1, 2013 City Council Agenda.

Nevada Revised Statute 701.220 requires the adoption of the latest version of the International Energy Conservation Code (IECC) and effective July 1, 2012 is the minimum standard for conservation and energy efficiency in the State. Currently, all local jurisdictions are required to enforce the 2009 version of the Code. It is intended to be a baseline for thoughtful design and building upgrades with several jurisdictions working under the newer 2012 version.

The very essence of the adoption of this energy code is to save building owners money over the long term. Upgrades to existing buildings are triggered when the building owner is already undertaking a renovation and provides an ideal opportunity to design and construct more comfortable, energy efficient, cost effective spaces.

The State and then Governor Gibbons committed to adopt and enforce the Code, and subsequent versions, throughout the state as a requirement of accepting valuable American Recovery and Reinvestment Act funds. With those funds, the Governor's Office of Energy has worked for over three years closely with jurisdictions by providing numerous training and certification opportunities, materials, equipment, and by providing technical assistance to building code officials and the building industry. Local building officials, architects, contractors and engineers from Las Vegas to Elko and Yerington attended public meetings, accepted grant funds and participated in the adoption of the regulations.

We have a successful Ambassador program whereby code officials have offered their time and expertise to less experienced code officials throughout the state. Additionally, the Energy Code Collaborative is a useful and free resource with goals to serve as a reliable and unbiased centralized source of information on building energy codes and code compliance in Nevada. The

Submitted at City Council
Date 5/1/13 Item 41 & 61
By: Betsy Fretwell

Collaborative strives to ensure building codes are consistently met throughout the state and that builders, lenders, appraisers, buyers, and state and local regulators have the knowledge and the tools they need to evaluate and assign value to building energy efficiency.

There are many options that building owners have when seeking compliance with the Code. If there has been some misunderstanding that there are only one or two ways to comply (such as tinted windows or prescribed systems), we would gladly work with building owners to inform them that there are highly trained and competent consultants around the state that can provide options that meet the needs of each individual space and business.

And finally as a reminder, State statute and regulations allow for local jurisdictions to petition the Director of the Governor's Office of Energy for exemptions if necessary and can be considered on a case-by-case basis. We certainly understand if there are unique circumstances that require individual attention and are happy to review the request.

The City of Las Vegas has been a strong supporter and contributor to energy related issues and have many times set the bar on making the commitment to reduce energy consumption. We thank you for the partnership and we look forward to continuing to work towards energy reduction and cost saving measures in the future. Please let us know if you have any questions or need any assistance along the way.

Sincerely,

Stacey Crowley

Stacey Crowley
Director